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ABSTRACT

This technical manual discusses some of the recent developments in the science of graphology and their implications for the science. The manual contains the following sections: (1) Graphology: An Introduction; (2) "CHAPS": Computerized Handwriting Analysis Profiling Systems; (3) HRC Profiles; (4) Reliability; (5) Validity; (6) Historical Review of Research; and (7) Legal and Ethical Issues. Sixty-seven references, a sample risk assessment instrument, a sample basic screening profile, a sample comprehensive profile, and a glossary of traits are attached. (RS)

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TECHNICAL MANUAL

by

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and

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As presented by

Judith S. Ettinger, Ph.D.
to the
American Psychological Association,
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Mark A. Hopper, M.C., President
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1. GRAPHOLOGY: AN INTRODUCTION

Historical Development of Graphology

Graphology is the study of handwriting shapes and patterns for the purpose of determining the personality and behavior of the writer. For centuries, the fact that no two handwritings are identical has spurred graphologists to investigate the relationship between character and handwriting. Aristotle, Napoleon and Sigmund Freud are just a few of the notables who recognized the value of graphology (Roman, 1968).

Little is recorded about the history of graphology before the seventeenth century. It is known, however, that for hundreds of years Chinese scholars believed that a person's handwriting revealed much about that person's character. In 1622, the first known published book on graphology emerged. This book was written by Camillo Baldo, an Italian doctor of medicine and philosophy and a professor at the University of Bologna (Baldo, 1664; Eliasberg, 1944).

It was not until much later that the word 'graphology,' the study of handwriting for purposes of ascertaining personality, appeared. It was coined by Jean Michon, a Frenchman, in the 1870's (Michon, 1878). First published in 1872, his research on handwriting analysis is still fundamental reading for serious students of graphology.

Used today as a psycho-diagnostic technique, handwriting analysis almost certainly emerged as an outgrowth of the science of expression that Ludwig Klages established (1910, 1913, 1940). Claiming that every human movement had to be considered as an 'expressive movement' from which the distinctive personality makeup of its author could be ascertained, Klages established a reference system of principles for interpreting these expressive aspects of human dynamics. After explaining and proving that handwriting is the only permanently recorded expressive movement made by an individual, he applied this system to handwriting. As he pointed out, since handwriting qualities can be measured and rated, a reliable system of interpretation could also be established and tested for psycho-diagnostic purposes.

Also significant during this time period was the work of Gordon Allport and Phillip E. Vernon at the Harvard Psychological Clinic. These researchers made three important and distinct contributions to the principles of graphology: 1) that personality is consistent, 2) that movement is expressive of personality, and 3) that a person's gestures and other expressive movements (such as handwriting) are consistent with one another. These three findings constitute a foundation for all practical attempts to diagnose personality on the basis of external movements (Allport and Vernon, 1933).

Further, the work of Kluge and Steinwachs in the 1950's and the earlier work of Wilhelm Preyer, a professor of physiology at Jena, also illustrated that handwriting is actually a behavior which can be measured, studied, and related to human personality. In actuality, handwriting is a misnomer since it is, more accurately, brainwriting. That is, handwriting movement is physiologically initiated, directed, and controlled by the brain. Messages are sent from the brain to the hand via the central nervous system; therefore, any disturbance or development which takes place in the brain eventually will be reflected in the writing behavior (Preyer, 1895).

Today, interest in graphology continues to be widespread in Europe. In fact, handwriting analysis has long been recognized in Europe both as a legitimate field of study and as a useful psychological assessment technique with applications in both employment and clinical settings. As a result, the psychology departments of several leading European universities offer a doctorate or master's degree with emphasis in graphology. Several professional journals are devoted to this specialty and a vast amount of literature has accrued (Lewinson, 1961; Wallner, 1975). In fact, since 1895, over 2,000 articles on this topic have been published in medical, educational, criminological and psychological journals.

With the advent of sophisticated computer technology, graphology, like other sciences, is being developed, tested and refined in ways and at speeds which were just a few years ago impossible to achieve. This manual will discuss some of these recent developments and their implications upon the science.

2. CHAPS: COMPUTERIZED HANDWRITING ANALYSIS PROFILING SYSTEMS

Why CHAPS Was Designed

There were many reasons for the development of the CHAPS project. Conceptually, the system's creators agreed that if the science of graphology was to be advanced, certain obstacles must be overcome, and that computerization and improved standardization of the analysis process would greatly enhance the development of both graphology and psychology.

In part, CHAPS was designed to be a solution to the potential shortcomings inherent in handwriting analysis as done by graphologists. Another important aspect of the CHAPS concept was to develop a psychological assessment tool which avoids many of the weaknesses often found in traditional methods of personality testing.

CHAPS Versus the Use of Graphologists

1. Because graphologists come from different schools of training, and are encouraged to develop their own style, they do not all utilize an identical method for measuring and evaluating handwriting shapes from which they make their assessments. The CHAPS analyst entry system requires all handwritings to be analyzed through an equal and identical process.

2. Graphologists do not all agree in their translations of specific handwriting shapes into personality attributes. When the graphologists disagree in their interpretations, low validity results. The CHAPS program interprets each handwriting shape in the same way each time it is analyzed, regardless of who conducts the analysis. This means that favorable research results are supportive of one another, as a single methodology of analysis is employed, which could not be assumed when graphologists are involved.
3. Grapholgists cannot apply all of their knowledge equally or as consistently to each handwriting they analyze as can the CHAPS program.
4. Whereas graphologists cannot be expected to remember all they have learned regarding handwriting analysis or to remember over time without distortion, the CHAPS program consistently and completely evaluates as it is instructed.
5. The distribution of new research results to all graphologists is difficult to achieve, and there are no assurances that these new findings will be incorporated by all practitioners. With CHAPS, new research-derived knowledge on the topic of handwriting analysis can be

easily incorporated into the computer program and all future analyses will benefit from the new findings.

6. Graphologists do not typically develop or give to their clients a definitions glossary for the traits they identify in their verbal or written interpretations. This may result in miscommunication between the graphologist and client during analysis explanation. For example, a graphologist may use the word 'flexible' to mean that the person is 'mentally' flexible, while the client may interpret this to mean 'social' flexibility. HRC addresses this issue by providing trait definitions on each Risk Assessment, and by providing a trait definitions glossary which encompasses both the Basic Profile and Comprehensive Profile (see Chapter 3).
7. Graphologists do not typically undergo formal training in the use of psychological instruments nor in management consulting, whereas the developers of the CHAPS program have extensive training in these areas. HRC's client service department is headed by a Ph.D.
8. Graphologists may wrongly believe that a certain handwriting feature represents a personality attribute, when in fact, it may not. Simply put, the graphologist might believe a trait is determined from specific

features in the handwriting, which may not necessarily be true. To determine if this is the case can only be established if all other methodological properties are being properly controlled, as can be done with a computer program.

9. A graphologist can be influenced by the content of the writing sample or possess some predisposed attitude about the writer which would temper, if not alter, his or her findings, (Ben-Skakhar, et al., 1986; Keinan, G, et al., 1984). To obviate this condition requires controlled contents of the writing sample and/or to have analysts who possess no knowledge of the interpretation of handwriting shapes into personality scores, as is the case with HRC.

10. Graphologists require many hours or days to produce a single comprehensive analysis report, whereas an HRC analyst requires approximately two to four hours to produce a comprehensive personality profile. In addition, the CHAPS program solves volume capability problems. Volume work can be accommodated by training additional analysts, producing consistent results, as analyst-raters all receive identical training, and every handwriting is analyzed in exactly the same fashion.

11. Graphologists require years of training and experience before obtaining expert status, whereas CHAPS trained analyst-raters reach quality levels within one month.
12. Because graphologists each interpret handwritings uniquely, according to their training and experience, it is difficult to establish a solid scientific foundation. The CHAPS system uniquely permits applications of scientific methods and principles which were before impossible or cumbersome to achieve utilizing graphologists. As a result, what previously required years of research can now be achieved in a matter of weeks.

CHAPS Versus the Use of Psychological Testing

Because an analysis of one's handwriting is not a "test" in the traditional sense of the word, it avoids many of the pitfalls often found in other forms of psychological evaluation, such as:

1. Updated information on tests typically requires a complete revision of the test and new validity evaluations.
2. Some test questions are outdated, as the test was designed many years ago.
3. Test validity changes as cultures change.

4. Tests may contain discriminatory and invasive questions, which either hinder or assist certain religious, ethnic, cultural, sexual or gender groups.
5. Administrator bias.
6. Tests require proper understanding by test subject of questions asked.
7. Test subject may attempt to anticipate desirable responses rather than to answer honestly.
8. Most tests require an interaction between subject and test administrator, which affects the outcome.
9. Physical handicaps may impair subject's performance.
10. Situational moods affect profile results.
11. Test subjects presence and cooperation are required.
12. Test subjects may suffer from test fright.
13. Retroactive limitations: Assessments can only measure a person's current status, not trends that have occurred in recent weeks, months or years.
14. Pencil and paper tests are not behaviors which can be measured.
15. Profiles are limited. Tests measure one aspect of a person's personality.
16. Tests often require enormous blocks of administrative time.

17. Tests require a great deal of subject's time to take a full battery of tests.
18. Test results often require lengthy explanations and are not understandable to the untrained.
19. Each test in a battery requires individual explanation.
20. Each test in a typical battery of testing employs unique terminology which is not cohesive with other test results.
21. Test subject may have undergone coaching to improve their results.
22. Test subject may have taken the test repeatedly, thereby gaining practice.
23. Test subject may be test sophisticated, having been trained and/or knowledgeable about test designs or construction.
24. Test subject may have made mistakes in answering questions.

The CHAPS program addresses head-on all of the aforementioned difficulties. HRC analysts using the CHAPS program are NOT graphologists. These analysts simply measure handwriting shapes and patterns without any knowledge of their interpretation into personality. The CHAPS program is responsible for deriving all interpretations of handwriting shapes into personality

attributes, which insures impartial treatment of all handwriting samples. And, since the program produces assessments through mathematical calculations, objectivity is maintained and greater consistency can be expected.

Other advantages exist as well, defined in other chapters of this text, which demonstrate legal, ethical and scientific benefits to graphology through use of the CHAPS program.

CHAPS Development

Work on the CHAPS program began in 1976 and still continues, with over $1,500,000 devoted to the development of CHAPS. HRC involved a team of professionals including two computer science specialists, and two graphologists who hold postgraduate degrees in psychology. The project began with a thorough review of published works on the topic of handwriting analysis which dated back to 1895 and originated from all over the world. Over 2,000 published studies were gathered, and the data were synthesized into a single system. To begin to test and refine the accuracy of the prototype program, thousands of handwriting samples were collected along with personality and on-the-job documentation.

An analyst entry system was then developed which asks the analyst 396 questions about the handwriting being evaluated. Each question contains a help screen to assist the analyst-rater in handling anomalies. Also provided to the analyst with each

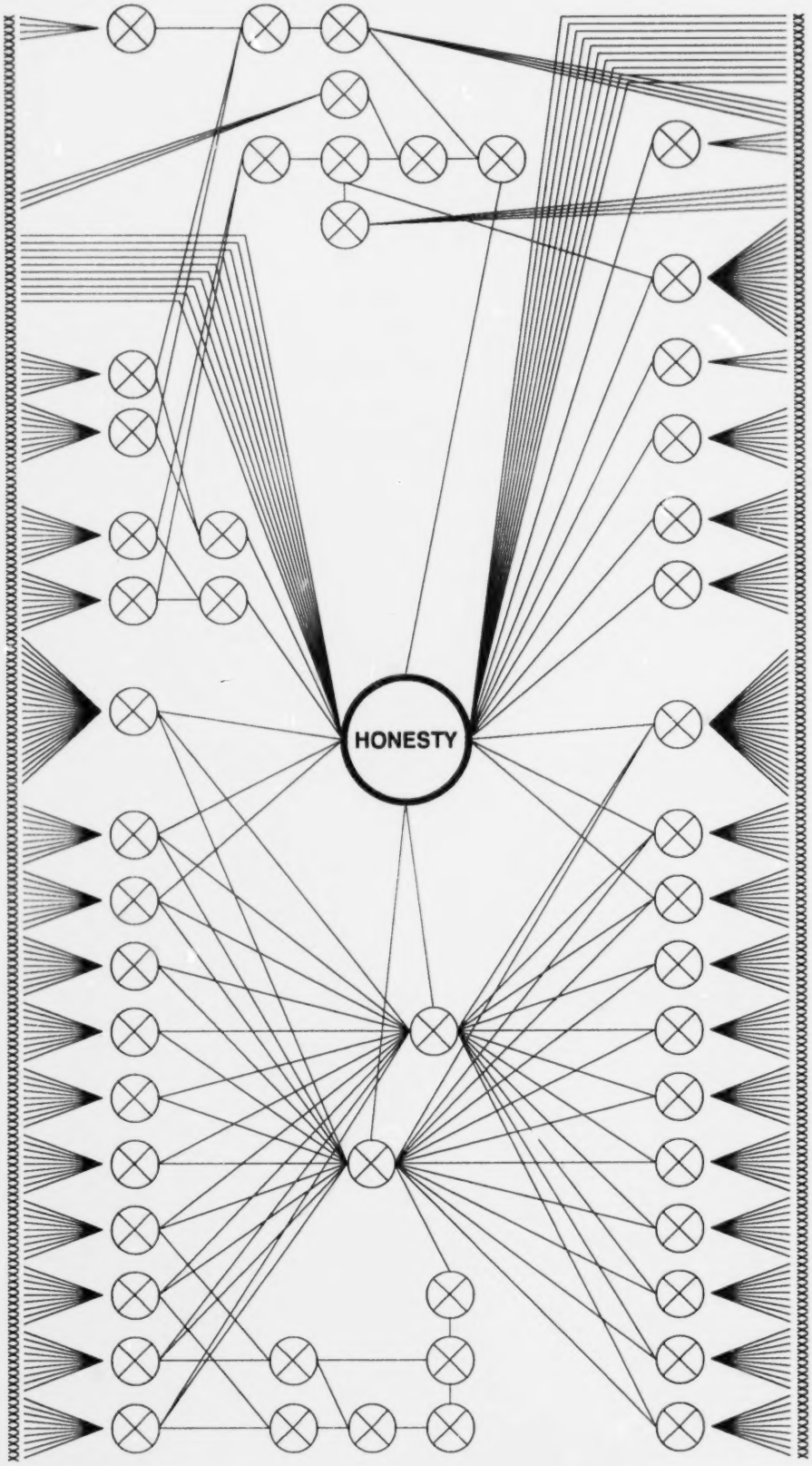
question posed are 25 to 150 handwriting examples to illustrate how the question should be answered.

The program which analyzes the input provided from the analyst-raters was based, in part, on the massive data base provided in research journals, and in part, on research findings established in-house. Specifically, the 396 questions are responded to with numbers (see Chapter 4). All rater responses are processed through approximately 500,000 calculations in order to produce scores for 126 personality traits.

Figure 1 depicts the transformation of analyst-rater responses to a single final personality score. The trait selected for illustration purposes was Honesty. Each small "X" which appears down the outside left and right side of the illustration represents one of the 396 questions asked for each handwriting analyzed. From the responses made by the analyst-raters, the CHAPS program then mathematically calculates and derives relationship patterns between individual answers, which are portrayed as a circle crossed through with an "X." For example, these internally evaluated packages may determine such things as how consistent the handwriting is throughout the sample or how close to copybook certain qualities of the writing may be.

For the trait Honesty, 342 of the 396 analyst responses are utilized in compiling a total score. The other 54 unused analyst

Figure 1. Trait Composite: Honesty



responses were not considered relevant to this particular trait. There are also different layers of internally evaluated information. The inner circles with "X's" actually determine major trends as established by the scores derived from the more outer levels. Although complex, this sophisticated system of analysis weighs the relationship of one indication or tendency against others, thereby identifying writing patterns. This pattern recognition system is therefore able to compensate for individual answers which are not in alignment with others due to incorrect analyst entry or an inadequate writing sample.

In sum, each trait assessed by the CHAPS program considers over 300 handwriting variables and is subjected to thousands of calculations before a final score is derived.

With the CHAPS program in place, the next critical area to be addressed was that of analyst training. To achieve the highest degree possible of objectivity and accuracy, it was agreed that HRC analyst-trainees should not have previous experience in the field of graphology. Thus, individuals without preconceived ideas could be taught a standardized system.

The purpose of developing an analyst training program for CHAPS was four-fold: 1) to create a training system whereby individuals could be taught to measure, count, and when necessary, assess handwriting shapes in the same way as a skilled graphologist; 2) to establish a system which would be both

reliable between different analyst-raters and would prove individual analysts to be reliable over time; 3) to prevent the content of a handwriting sample from affecting the analysis results by keeping analysts blind as to how their responses affect results; and 4) to foster research on the validity of the CHAPS program without continual concerns about the consistency of one analyst versus another in every research project undertaken.

The computer equipment utilized by analyst-raters during the training and in the analysis process includes three components. The first is a computer terminal which prompts the analysts with 396 questions about a handwriting. When each question is posed, assistance is also available which provides instructions on how to deal with different writing conditions. For example, information is given on how to respond when a writing sample is printed versus cursive or if the letters to be examined are omitted from the sample.

The second component is a detailed rating manual. Along with the questions and supporting guidelines provided by the terminal screen, each analyst is given this 200-page manual which contains photocopied handwriting segments. These handwriting examples illustrate how various scores should be assigned on any given question. Finally, each analyst is issued a set of plastic overlays which permit the analyst to measure specific

aspects of the handwriting such as slant, margins, etc. These measuring devices were designed for and are utilized only by HRC.

Equipment Utilized

A model S/640 Mighty Frame II minicomputer from Convergent Technologies was selected to process the data, to transform analyst-rater responses into the psychological printouts, and to do all required statistical analyses. This system is a high-performance 32-bit minicomputer based on the Motorola 25 mhz 68020 microprocessor and a 25 mhz 68881 floating point co-processor. It currently runs the UNIX operating system, Version V.2. The S/640 Computer supports up to 64 active users concurrently, while allowing the connection of up to 160 interactive devices. A Kyocera F3010 high-speed laser printer is used to produce the profile data.

3. HRC PROFILES

HRC produces three personality assessment profiles, the Risk Assessment, the Basic Profile and the Comprehensive Profile (see Appendix for copy of each).

Risk Assessment

The Risk Assessment is designed to screen and evaluate individuals who are involved with security, safety and cash (guards, pilots, drivers, tellers, cashiers, etc.). The Risk Assessment is a single-page report displaying four security-sensitive areas with a Summary explaining the scores. This profile measures an individual's Honesty, Emotional Stability, Judgment and Risk of Substance Abuse.

Basic Profile

The Basic Profile includes a sixteen-trait Bar Chart, followed by two pages of trait definitions and arrows which recap the Bar Chart scores. The Basic Profile broadly assesses four key areas of personality. This three-page report is a preemployment, initial screening tool designed to give an employer a general overview of a prospective employee. The Basic Profile is best used when comparing several applicants for the same position. It can be upgraded to a Comprehensive when more

detailed information is needed. Consultation is included with each profile.

Comprehensive Profile

The Comprehensive Profile is HRC's most detailed and versatile personality profile. The in-depth, eight-page report is designed for job hiring, interviewing, performance appraisals, team-building and self-improvement. The Comprehensive Profile is divided into three parts: A four-page Trait Analysis Graph measuring 126 Mental, Social, Motivational and Emotional traits; two pages listing personality Strengths and Weaknesses; and a Summary Evaluation tailored to clients' specific interests and prepared by a client service professional. Consultation is included with each profile. A glossary of trait definitions is also provided (see Appendix).

Definition of Traits-- Risk Assessment

Because the first four validity studies are based on the traits measured by the Risk Assessment, the definitions and cutoff scores for the five divisions of the four trait groups evaluated are shown below.

Honesty

Very High: (Score of 90.00 - 100.). Those individuals who are exceptionally sincere and honest. A person of high integrity, one who faithfully adheres to the truth and feels compelled to be truthful at all times.

High: (Score of 65.00 - 89.99). Those individuals who show good integrity and honesty; can be counted upon to communicate the truth, more so than most people.

Average: (Score of 35.01 - 64.99). Those individuals who exhibit normal levels of honesty and trustworthiness as found in the general population.

Low: (Score of 10.01 - 35.00). Those individuals who are situationally untrustworthy and dishonest; will deceive and mislead others, and will hide the truth for self-protection or personal gain.

Very Low: (Score of 0 - 10.00). Those individuals who are extremely deceitful and devious; those who falsify the truth for personal gain; evasive, cunning and dishonest.

Emotional Stability

Very High: (Score of 90.00 - 100.). Those individuals who are extremely well-disciplined and stable. Unshakeable, even-keeled temperament. Very predictable, consistent and dependable.

High: (Score of 65.00 - 89.99). Those individuals who are predictable and dependable; self-disciplined. Reliable and stable; emotionally even-tempered. Consistent reactions to situations.

Average: (Score of 35.01 - 64.99). Those individuals whose emotional maturity and ability to handle pressure are in the average range. Some emotional inconsistencies are to be expected; average amount of self-control.

Low: (Score of 10.01 - 35.00). Those individuals who are moody and unpredictable in their reactions; inconsistent emotional behavior; lack of consistent self-control. Greater self-discipline is needed.

Very Low: (Score of 0 - 10.00). Those individuals who are very unstable/unreliable; do not handle stressful situations effectively; out-of-control reactions; highly emotional and temperamental.

Judgment

Very High: (Score of 90.00 - 100.). Those individuals who possess advanced intellectual development. Possesses superior discretion, a highly refined and sharp mind that displays superior reasoning ability. Simplifies and solves difficult problems easily.

High: (Score of 65.00 - 89.99). Those individuals who have strong decision-making skills; sound reasoning and evidence of pronounced intellectual development. An effective problem-solver who exhibits proper discretion.

Average: (Score of 35.01 - 64.99). Those individuals whose decision-making skills fall within the mainstream of the general population. Relies upon conventional reasoning; exhibits normal discretion.

Low: (Score of 10.01 - 35.00). Those individuals who have poor decision-making skills; undeveloped discretion; difficulty in selecting proper solutions to problems.

Very Low: (Score of 0 - 10.00). Those individuals who make poor decisions, lack mental skills and/or are emotionally unstable. Shows poor discretion in handling matters; not thinking clearly.

Substance Abuse Risk

Very High: (Score of 90.00 - 100.). Those individuals who have addictive personalities; those who abuse alcohol or drugs, or become dependent upon other types of self-destructive/ addictive behaviors.

High: (Score of 65.00 - 89.99). Those individuals who are prone to addictive behavior, such as drug or alcohol abuse or other addictive and self-destructive habits.

Average: (Score of 35.01 - 64.99). Those individuals who exhibit no evidence of being either a high or low risk for drug or alcohol abuse. Normal tendencies exist, equivalent to those of most people.

Low: (Score of 10.01 - 35.00). Those individuals who are not likely to become addicted to or abuse drugs or alcohol; excellent self-control and discipline.

Very Low: (Score of 0. - 10.00). Those individuals who have virtually no addictive tendencies. Very unlikely that these persons would abuse alcohol or drugs; exhibit superior self-control.

Norms and Formula Development

Norms for the assessed traits were derived from 3,060 handwriting samples collected over a 12-year period. The individuals who provided handwriting samples to establish this normative database represent a broad diversity in terms of age, race, educational background and level, demographics, physical handicaps, and gender.

Sincere/Honest

370 handwriting samples were collected from individuals free of any criminal convictions and who had demonstrated a long-term history (minimum of 10 years) of integrity, honesty and good

reputation in their work. The writing samples collected were provided through a combination of various corporations, church groups, universities and police organizations.

Insincere/Dishonest

290 handwriting samples were collected from individuals who possessed a chronic criminal record of theft, embezzlement, breaking-and-entering or other related charges involving dishonesty. The writing samples collected were provided by heads of security from several corporations and through various prison facilities.

Emotional Stability

460 handwriting samples were collected from individuals who had a history (minimum of 15 years) of emotional stability/consistency and control, as demonstrated by having maintained long-standing consistent relationships and career stability. The data were obtained through assessments made by spouses and through employer records.

Emotional Instability

380 handwriting samples were collected from those who had a history (minimum of 10 years) of emotional illness, and who were unable to maintain long-term relationships and job stability.

The writing samples were provided by various psychiatric clinics and hospitals, clients of psychotherapists, and from police files.

Sound Judgment

450 handwriting samples were collected from individuals who had illustrated advanced judgment and decision-making skills. Writing samples were collected from highly successful individuals in various job fields: Chief executive officers from various industries, inventors, physicians, judges, scientists and other professionals who had demonstrated advanced intellectual performance.

Poor Judgment

320 handwriting samples were collected from individuals who had repeatedly demonstrated an inability to make intelligent or appropriate decisions. This included an inability to make reasonable and normal life decisions illustrated by criminal activity, extreme self-defeating behavior, and an inability to handle appropriately the most simple of matters due to a lack of intellectual development. These writing samples were provided through various counseling and financial clinics as well as through employer records and prison facilities.

Low Substance Abuse Risk

480 handwriting samples were collected from individuals who had no experience with alcohol, addictive drugs, gambling or other types of addictive obsessive behaviors. Samples were collected based on self-report data along with confirmation from close family members. Handwriting samples were provided through various religious organizations, charity groups and universities.

High Substance Abuse Risk

350 handwriting samples were collected from individuals who had a history of abusing any one or more of the following: Alcohol, drugs, food, gambling or other obsessive behaviors to the point of having lost employment and family support. Samples were collected from alcohol abuse treatment centers and from various employers.

Initially, all research on these four traits was reviewed, and a collection of all handwriting variables which tested positive for each trait was compiled. At this point, handwriting samples were gathered from individuals who were documented to have possessed the tested traits. These handwritings were then analyzed using the compiled list of handwriting factors as established by previous research. The CHAPS system was able to identify that certain of the handwriting shapes did indeed

differentiate bipolar groups. Further, CHAPS was able to identify additional writing qualities which could assist in separating the bipolar groups more accurately.

Components of the Risk Assessment

The Risk Assessment report consists of a single sheet which is divided into four areas. Part one contains general data. The first portion contains, in part, a Client Code number. The first portion of the number is unique to each client while the second portion represents the number of writings submitted by that client. Each profile contains the date the analysis was conducted and specifies the purpose of the analysis. In order to insure greater confidentiality, no names, client or subject's, are used. In addition, the following statement appears:

> "The opinions contained herein are based upon a personality assessment derived from a handwriting sample. Like other personality instruments, these results should be used in conjunction with other sources of information. This person's scores match those who possess the below attributes to the degree described. This Assessment is intended for the sole and confidential use of the client."

The above statement informs the reader that the profile assessment is opinion. It reminds the user that other sources of information should also be considered when making employment decisions. Lastly, the statement informs the reader that the profile is confidential and should be treated as such. It is constructed for the private use of the client.

Part two presents the Results. This portion of the profile graphically displays the four traits with arrows portraying the strength of each measured trait.

The third part, Analysis, defines each trait score. Definitions are specific to the score level.

The last part, Summary, coordinates the results of the four individual scores into a synthesis for better understanding and client use.

4. RELIABILITY

Reliability is used to describe the stability of a test or scale. When a test or scale is reliable, it is considered trustworthy with respect to being consistent internally, across time, across forms of the test, and across raters. The Standards for Educational and Psychological Testing (AERA/APA/NCME, 1985) describes reliability as the degree to which test scores are free from errors in measurement.

When determining the reliability of personality trait scores derived from the CHAPS program, three types of reliability should be considered. These are interrater reliability, test-retest reliability, and alternate form reliability.

Interrater reliability refers to the degree to which two or more analysts agree in their ratings of a handwriting quality. Although CHAPS has standardized the analysis process and the analysts do not function as graphologists, it is imperative that analysts using CHAPS respond to the 396 CHAPS questions in a similar manner so that the derived scores are equivalent.

Test-retest reliability controls for errors due to time and errors due to content. When using CHAPS it is essential that analysts be consistent in their own measurements over time and that they be consistent with each other. If the time interval between testings is too short, memory may influence ratings.

Therefore, it is important when conducting an investigation of test-retest reliability to allow sufficient time to pass before conducting the retest phase of the study. For the empirical investigation of the test-retest reliability of the Risk Assessment, six weeks were allowed between the Phase I analyses and Phase II analyses of the same handwritings.

Alternate forms reliability becomes relevant to the issue of changes in one's handwriting over time and their effect on analyses results. To study this type of reliability, a subset of the group involved in the larger study provided two samples of their handwriting. This second handwriting was analyzed by one analyst after the completion of the Phase II analysis. The time between analyzing form 1 and form 2 was approximately two months, thereby reducing errors due to memory.

An Empirical Investigation of Reliability

To address the three relevant types of reliability, a comprehensive study was conducted with three trained analysts. Initially, three individuals were selected for CHAPS training. One person had worked as an HRC prototype analyst-rater for two years during the developmental stages of the training program. As a result, instructions to this person constantly changed as improvements to the training program were made. The other two analyst-raters were hired specifically for training in CHAPS.

None of the three analyst trainees had any exposure to graphology prior to their employment with HRC. Further, none of the analyst trainees had been instructed in or exposed to the interpretations of handwriting shapes into personality attributes.

During the first two weeks of training, the trainees became familiar with the unique language of handwriting analysis and had each question in the manual explained in detail. Additionally, each analyst received a copy of the HRC Training Manual for reference. During weeks three through ten, all trainees were given the same 45 writings to analyze, and the analyst-raters and instructor held weekly meetings to review areas where the raters disagreed. Possible solutions were discussed and revisions to the training program were made. The handwriting samples varied in difficulty at different intervals, based upon the judgment of the trainer to test various learning conditions. This explains the periodic fluctuation in rater agreement and should not be interpreted as inconsistent performance among the raters. In fact, as the pre-training continued, the complexity and difficulty of the handwritings submitted to the raters for analysis increased overall. Despite these progressively adverse conditions, rater agreement continued to show stability or improvement. During this training period, rater agreement across the 45 handwritings on the various types of questions is presented in Table 1, Results of Training Process Rules.

Table 1. Results of Training Process Rules

			Types Of Ratings*									
Subject	Yes/No	% Resp	0-100 a	0-100 b	3-Part a	3-Part b	5-Part a	5-Part b	9-Part a	9-Part b	21-Part a	21-Part b
1-5	.81	.50	.74	.61	.45	.76	.31	.71	.61	.72	.90	.70
6-10	.85	.65	.71	.65	.57	.81	.25	.80	.71	.73	.90	.80
11-15	.82	.70	.76	.70	.56	.80	.30	.64	.80	.82	.90	.80
16-20	.86	.85	.74	.81	.54	.87	.31	.80	.74	.75	.80	.80
21-25	.80	.80	.70	.76	.57	.87	.46	.71	.72	.80	1.0	.70
26-30	.83	.80	.67	.80	.55	.92	.45	.83	.64	.83	.85	.80
31-35	.92	.80	.74	.76	.63	.97	.36	.66	.72	.76	1.0	.80
36-40	.86	.90	.71	.98	.54	.87	.30	.75	.82	.75	.90	.50
41-45	.91	.80	.75	.76	.62	.86	.31	.79	.82	.81	.90	.90

**Note: See following subsections "Items: Types of Ratings" and "Decision Rules for Analyst Training".*

Items: Types of Ratings

When using the CHAPS procedure to analyze handwritings, the analyst makes 396 distinct ratings. These ratings can be divided into nine different categories or item types. Since CHAPS, unlike a typical paper and pencil personality test, does not have items to which an examinee responds, patterns and characteristics in the handwriting must be rated instead. Following are the nine "item" types used in CHAPS:

1. Yes/No ratings which are each scored zero or one hundred, depending on whether the designated handwriting quality being examined is present or absent. Twenty-nine yes/no ratings are made by an analyst using CHAPS.
2. Three-Part items are rated 0, 50, or 100. Fifty-two ratings are of the Three-Part variety.
3. Five-Part items are used to rate a handwriting quality as 0, 25, 50, 75, or 100. Fifteen Five-Part items are included in the CHAPS ratings.
4. Six-Part items are similar to the Five-Part items. The analyst can rate a quality using six distinct ratings: 0, 25, 50, 75, 90 or 100. Only one item is judged using the Six-Part rating format.

5. Nine-Part Multiple Response format is used to rate a handwriting quality on a nine-point scale: 0, 10, 25, 40, 50, 60, 75, 90, or 100. For these items, a rating of 50 is considered copybook which means that it matches the standard writing style children are taught in American elementary schools. Deviations from the standard (50) are of significance. When using CHAPS, 26 handwriting qualities are rated using the Nine-Part Multiple Response format, yielding 234 ratings.

6. Twenty-one-Part Multiple Response ratings test both consistency of a writing style within one sample of handwriting and the degree of match with copybook in terms of slant and middle zone height. Two handwriting characteristics are rated using the 21-Part Multiple Response rating which result in 42 ratings.

7. Four-Part Multiple Response ratings require four separate ratings for each of two question areas. Each of these ratings is a numerical frequency ranging from 0 to 100. Eight ratings are made for this response type.

8. Percentage Response ratings are those qualities rated for the percent of time they are present in the handwriting sample. Four handwriting characteristics are evaluated using the Percentage Response format.

9. 0 to 100 ratings are used to judge 11 handwriting characteristics. Deviations from a rating of 50 become important in determining different personality dimensions.

It should be noted that although 396 individual ratings are made, these ratings are used to mathematically derive scores for the various personality characteristics. Unlike most paper/pencil personality instruments, the items do not contribute to one and only one personality trait. In fact, using the CHAPS system allows the computer to take a myriad of ratings which in and of themselves may have limited utility, and to combine them to calculate a meaningful score relevant to the personality trait under examination.

Decision Rules for Analyst Training

After the initial training of the three analysts, a series of decision rules was established to determine when the raters were in sufficient agreement on the nine item types to proceed with studies of reliability and validity. The decision rules were based on the expertise of one of the designers of CHAPS who is also a recognized, extensively experienced graphologist, and on the advice of a statistical consultant. The extent to which each item type would have a mathematical impact on the calcu-

lation of personality characteristics significantly influenced the stringency of the decision rule since rater error in perception could cause error in determining the level of a personality trait. The rules were:

1. Yes/No Responses -- Analysts must achieve 80 percent agreement across all items for at least 10 of 12 handwritings.
2. Three-Part -- a) At least 50 percent of the ratings must be identical for all three analysts, and b) no less than 75 percent of the remaining ratings must be no more than one rating apart. These criteria must be met for 10 of 12 handwriting samples.
3. Five- and Six-Part -- a) At least 25 percent of the ratings must be identical across analysts, and b) at least 60 percent of the remaining ratings must be no more than one rating apart. This rule must be met for 10 of 12 handwriting samples.
4. Nine-Part Multiple Response -- a) At least 75 percent of the ratings for scores between 0 and 40 must be no more than 31 percentage points apart, and b) at least 70 percent of the ratings for scores between 60 and 100 must be no more than 31 percentage points apart across

all analysts. These two criteria were to be met for 10 of 12 handwritings.

5. Twenty-One-Part Multiple Response -- a) At least 75 percent of the ratings must be within the same 16-point response range for copybook of slant and middle zone height, and b) at least 70 percent of the ratings must be within the same 26-point range for consistency of slant and middle zone height across all analysts. Part "a" was to be met for 10 of 12 handwriting samples, and part "b" for eight of 12 handwritings.
6. Four-Point Multiple Response and Percentage Responses -- Across all three analysts, 80 percent of the standardized percentages must be within the same 21 percentage point range.
7. 0 to 100 -- a) At least 70 percent of the ratings must be within 21 points of each other, and b) no less than 85 percent of the remaining ratings must cluster either above 50 or below 50. These criteria had to be met across all three raters for eight of 12 ratings.

Testing for the decision rules began after the analysts had received their initial training and had become familiar with CHAPS and the CHAPS Training Manual. Analysts began the process with ideal samples of handwriting and progressed to less ideal

and therefore more difficult-to-rate samples. Ideal samples are written in pencil, are originals, are on unlined, letter-size paper, are approximately one page in length, and are signed. Improper samples are typically any combination of the following: too short, written in pen, have no signature, are facsimiles or photocopies, or photocopies of facsimiles, and/or are written on lined paper.

Twelve handwriting samples were selected from a large pool of handwritings from people representing a variety of occupations. A deliberate attempt was made to select both adequate and inadequate samples in order to get a better measure of the analysts' readiness to proceed with the reliability studies.

Each of the analysts rated each of the twelve writings in the same order. The established criteria were assessed for each of the twelve handwritings. Table 2 presents the results for each of the seven decision rules. As will be noted, all of the established decision rules were met by the three analysts jointly; therefore, it was determined that the analysts were sufficiently ready to begin the reliability studies.

Table 2. Results of Decision Rules

			Types Of Ratings*				
Subject	Yes/No	% Resp	0-100 a b	3-Part a b	5-Part a b	9-Part a b	21-Part a b
1	.86	.83	.82/1.0	.56/.78	.38/.73	.85/.65	1.0/.50
2	.79	.92	.64/1.0	.48/.74	.31/.83	.85/.81	.50/.00
3	.86	.83	.73/1.0	.69/.88	.06/.60	.81/.77	1.0/1.0
4	.83	.92	.73/1.0	.67/.88	.56/.38	.81/.69	1.0/1.0
5	.83	.92	.55/1.0	.58/.82	.44/.70	.77/.96	1.0/.50
6	.97	.75	.73/.67	.50/.69	.31/.67	.77/.73	1.0/1.0
7	.83	.83	.82/1.0	.54/.96	.38/.82	.85/.69	1.0/1.0
8	.86	.75	.73/.33	.69/.88	.19/.62	.77/.85	.50/1.0
9	.93	.83	.82/.50	.67/.82	.31/.82	.92/.88	1.0/1.0
10	.86	.58	.55/.60	.63/.95	.44/.60	.65/.88	1.0/.50
11	.90	.92	.82/1.0	.69/1.0	.25/.46	.81/.77	1.0/1.0
12	.90	.83	.45/1.0	.46/.96	.25/.77	.69/.85	1.0/.00
	Passed 11 of 12	Passed 11 of 12	Passed 8 of 12	Passed 10 of 12	Passed 10 of 12	Passed 10 of 12	Passed 10 of 12

**Note: See following subsections "Items: Types of Ratings" and "Decision Rules for Analyst Training".*

Study Sample

Forty-one handwritings were analyzed for the interrater and test-retest reliability studies. Seventeen females and 24 males provided writings. Their average age was 30.2 years, and all but three had learned to write in the United States. Of those who responded to the question about handedness, 32 were right-handed and 5 left-handed. Other demographics included: Ethnicity: 27 Caucasian, 6 Black, 5 Hispanic, 2 Asian, and 1 American Indian. Educational Attainment: 3 held advanced graduate degrees, 14 held the BS/BA degree, 6 had AAs, and 18 had a high school or less education. Occupation: 8 managerial, 6 professional, 3 technical, 8 sales, 5 clerical and 11 other. Marital Status: Of those who responded to the question, 13 were married, 18 single, 3 divorced, 1 separated, and 1 living in a committed relationship. Ten reported having children.

Procedures

Each analyst received the 41 handwritings in a random order and was instructed not to discuss the handwritings or the manner in which the 396 questions were answered with either of the other raters. The first time the handwritings were analyzed will be referred to as Phase I and the second time as Phase II. A six-week period separated Phase I and Phase II, thus allowing time for memory effects to decrease. The data for the intraclass

reliability and test-retest coefficients are based on 41 handwritings and the data for the alternate forms reliability are based on a subsample of five writings.

Intraclass Reliability

Ebel's intraclass reliability coefficient was used to determine the degree of variability among the three raters at the end of both Phase I and Phase II. As can be seen in Table 3, all Ebel coefficients were in the moderately strong to strong range for both phases. In addition, when the correlations among the three analysts were calculated for both phases, it was evident that there was significant agreement in both perceptions and measurements among the three analysts. From this data, one can conclude that the three analysts viewed the handwritings in like manner and any analysis resulting from one rater would be equivalent to that of another. All of the intraclass reliability coefficients were significant at the .05 level which indicates that they did not occur just by chance.

Table 3. Intra-rater Reliability and Inter-analyst Correlations: Phases I and II

PHASE I

	Ebels	DM PPM	DA PPM	AM PPM	AVG PPM
Substance Abuse Risk	.80	.72	.76	.71	.73
Honesty	.75	.65	.60	.79	.67
Emotional Stability	.86	.68	.72	.69	.70
Judgment	.82	.71	.68	.58	.66

PHASE II

	Ebels	DM PPM	DA PPM	AM PPM	AVG PPM
Substance Abuse Risk	.71	.62	.72	.75	.70
Honesty	.72	.74	.69	.63	.69
Emotional Stability	.86	.63	.82	.74	.73
Judgment	.85	.73	.71	.75	.73

Test-Retest Reliability

The six week test-retest reliability coefficients for the Risk Assessment were also strong. The correlations between Phase I and II for each analyst (intra-analyst test-retest reliability) are reported in Table 4. It is evident that each rater was in strong agreement with him or herself over time. They did not perceive the same things differently at different points in time. Table 5 presents the correlations among pairs of analysts for Phase 1 and for Phase II. All of these correlations represent significant relationships at a .05 probability level.

To provide some insight into the agreement among the three raters, data for five subjects rated by all three raters for both Phase I and Phase II are presented in Table 6. The scores for the subjects represent levels of the four Risk Assessment traits with 1 for very low levels, 2 low levels, 3 average, 4 high levels, and 5 very high levels. For the three analysts, between Phase I and Phase II they have 85% to 100% agreement for the four traits when agreement is defined as scores being no more than one point apart. This is another strong indication that the personality and perceptions of each analyst do not influence their ratings of handwritings. Scores on the Risk Assessment would be consistent regardless of which analyst rated the handwriting.

Table 4. Intra-analyst Six Week Test - Retest Reliability

	Analyst 1 (n=41)	Analyst 2 (n=41)	Analyst 3 (n=41)
Substance Abuse Risk	.78	.86	.90
Honesty	.75	.90	.76
Emotional Stability	.77	.90	.84
Judgment	.75	.77	.83

Table 5. Inter-analyst Phase I and Phase II Correlations*

	Substance Abuse Risk			Honesty		
	A1	A2	A3	A1	A2	A3
Analyst 1	-	.72	.76	-	.65	.60
Analyst 2	.62	-	.71	.74	-	.79
Analyst 3	.72	.75	-	.69	.63	-

	Emotional Stability			Judgment		
	A1	A2	A3	A1	A2	A3
Analyst 1	-	.68	.72	-	.71	.68
Analyst 2	.63	-	.69	.73	-	.66
Analyst 3	.82	.74	-	.71	.75	-

**Phase I Correlations are in the upper-right of each matrix, Phase II lower-left.*

Table 6. Scores for Four Traits across Analysts and Phases

		PHASE I			PHASE II		
	Subject	A1	A2	A3	A1	A2	A3
Honesty	1.	2	2	2	2	3	2
	2.	2	2	4	2	3	3
	3.	2	3	2	2	3	3
	4.	3	3	4	3	3	3
	5.	2	2	2	2	2	2
Emotional Stability	1.	3	3	3	3	3	3
	2.	3	2	2	3	3	2
	3.	2	3	2	3	3	3
	4.	4	4	3	4	4	3
	5.	2	2	2	2	3	2
Judgment	1.	2	2	3	2	2	3
	2.	4	2	3	3	2	3
	3.	2	4	4	4	4	4
	4.	3	4	4	3	4	4
	5.	1	2	2	1	2	2
Substance Abuse Risk	1.	3	3	3	3	3	3
	2.	3	4	3	4	4	3
	3.	4	3	3	4	3	3
	4.	3	3	3	3	3	3
	5.	4	4	4	4	4	3

1= Very Low 2= Low 3= Average 4= High 5= Very High

Alternate Forms

To determine whether two separate handwriting samples from the same individuals would yield the same personality profile on the Risk Assessment, a subset was drawn from the total sample. These individuals provided two different writing samples written between one hour and one year apart. These were randomly ordered so that one was used in the test-retest reliability study and one in the alternate forms investigation.

The correlations between the two handwriting samples are very strong and highly significant at the .05 probability level. This is particularly impressive as one of the test samples was written one year after the first sample, and the minute inconsistencies in analyst responses could easily be attributable to changes in the subject's personality (therefore handwriting changes) rather than inconsistencies in analyst's measurements. The results are as follows:

Substance Abuse Risk	.94
Honesty	.83
Emotional Stability	.92
Judgment	.70

To provide further insight into the type of scores received by subjects over time and across different samples of their

handwriting, data from five subjects are presented in Table 7. In addition, the reliability between Phase II ratings and the alternate forms are given. Again, the reliability coefficients are strong and indicate that the CHAPS method of assessing personality does not change as a result of which sample of one's handwriting is assessed. Further, it substantiates the premise that one's writing does not significantly change from day to day.

Summary

It is evident from this research endeavor that the Risk Assessment is a stable, consistent measure of the four personality traits: Substance Abuse Risk, Honesty, Emotional Stability, and Judgment. Not only does the sample of handwriting used for the analysis not significantly change the resulting personality profiles, but the analyst rating the handwriting qualities is not a significant factor in the personality trait scores that an individual receives.

The traits measured for the Basic Screening Profile (see Appendix) were also examined to determine whether they were as highly reliable as the Risk Assessment traits. For example, the Ebel's intraclass reliability coefficients for Phase I for the Basic Screening Profile ranged from .77 to .93. The Ebel's for Phase II ranged from .73 to .92. These are very impressive

Table 7. Alternate Forms of Handwriting: Standard Scores and Alternate Form Reliability

	Subject	PHASE I	PHASE II	PHASE III	
Honesty	1.	2	2	2	
	2.	2	2	2	
	3.	2	2	2	r = .94
	4.	3	3	4	
	5.	2	2	1	
Emotional Stability	1.	3	3	3	
	2.	3	3	3	
	3.	2	3	3	r = .83
	4.	4	4	4	
	5.	2	2	2	
Judgment	1.	2	2	2	
	2.	4	3	3	
	3.	2	4	3	r = .92
	4.	3	3	4	
	5.	1	1	1	
Substance Abuse Risk	1.	3	3	4	
	2.	3	4	4	
	3.	4	4	4	r = .70
	4.	3	3	3	
	5.	4	4	5	

1= Very Low 2= Low 3= Average 4= High 5= Very High

coefficients which indicate strong agreement among the three analysts at both testing times. The magnitude of the test-retest reliability coefficients were comparable to those of the Risk Assessment.

The data gathered from this research confirm the reliability of the Risk Assessment and are supportive of the reliability of the Basic Screening Profile. Further, there is no reason not to believe that the reliability figures for the Comprehensive Profile would not be equally as strong. This is true because all traits evaluated by HRC are derived from the 396 rater responses which have been measured to be consistent, regardless of analyst or writing sample.

5. VALIDITY

While there have been over 2,000 published studies examining both the reliability and validity of graphology in various professional journals from around the world, it is still imperative that research continue. To further this end, the CHAPS program brings about a new methodology and standardization to graphology.

Validity indicates how well a test measures what it is designed to measure. In the case of HRC's products, this would mean how well the scores on traits such as Substance Abuse Risk, Honesty, Emotional Stability, Judgment and others, actually measure these personality characteristics. Five empirical studies were conducted and are reviewed here to investigate the validity of HRC's CHAPS.

Each of the first four investigations was designed to test criterion-related validity through the use of the contrasted groups approach. As Anastasi (1976) has pointed out, the use of contrasted groups is common in validating personality tests. The assumption underlying this procedure is that individuals comprising distinct groups will have different personality profiles. This approach is frequently used in describing individuals in differing work groups or professional occupations.

Study five examines predictive validity.

Study One: Honesty

This study was designed to investigate the ability of scores on the Honesty scale of the Risk Assessment to differentiate among three groups of individuals who had been classified by level of known honesty. Initially, 201 persons were classified into one of three groups, Very High Honesty, Average Honesty, and Very Low Honesty, and samples of their handwritings were analyzed.

Those 63 classified as Very High Honesty had demonstrated a history of integrity in their work performance for over a minimum of 10 years, including confessions of self-defacing errors or mistakes and the return of lost money or assets. They were recognized for consistently high honesty and sincerity among colleagues and family and known for their unwillingness to be dishonest or to misrepresent themselves. None of these individuals had a criminal history. Forty-five were classified as Average Honesty. While there was no criminal history among these persons, they would periodically lie or, on rare occasion, would have taken something harmless that did not belong to them. At times these individuals have misled others to protect their own interests, but only in relatively unimportant matters. The

last group, Very Low Honesty, was comprised of 93 persons who had a repeated history of criminal convictions or activity such as theft, perjury, fraud, embezzlement, breaking-and-entering, and other related crimes. These individuals habitually lie and deceive others when it is to their advantage.

The average age of the 112 males and 89 females involved in this study was 45 years with an age range from 19 to 70 years. These 201 subjects had a mean of 13.5 years of education, although educational level varied from 10 to 21 years of schooling. In addition to being representative of various geographic locales across the United States, for example California, Arizona, Florida, New York, North Carolina, and Kentucky, the subjects were ethnically diverse: 107 Caucasian, 34 Black, 28 Hispanic, 12 Asian, and 20 European.

A one-way analysis of variance examining levels of honesty among these three groups revealed significant group differences, $F(2,204) = 395.19$, $p<.0001$. A Scheffe multiple comparison procedure indicated that those classified as Very High Honesty ($M=77.18$) had significantly higher Risk Assessment Honesty scores than did those in either the Average Honesty ($M=38.16$) or Low Honesty ($M=13.36$) groups. In addition, those in the Average Honesty group had significantly higher scores that those in the Very Low Honesty group. These differences were in the expected

direction and help to establish the criterion-related validity of the Honesty scale of the Risk Assessment.

Study Two: Emotional Stability

One hundred ninety-one individuals were involved in a study conducted to establish the criterion-related validity of the Emotional Stability scale of the Risk Assessment. The individuals were classified into three groups representing Very High Emotional Stability, Average Emotional Stability, and Very Low Emotional Stability.

Those who comprised the Very High group (n=60) had a long history of stability in relationships and their careers, and were considered to be very mature emotionally, predictable in their behaviors, and able to handle day-to-day conflicts and extreme difficulties exceptionally well as determined by peers and family members. The Average Emotional Stability classification (n=54) consisted of individuals capable of functioning effectively in relationships and in job settings, yet not considered extraordinarily stable, consistent or predictable by their family and/or work associates. Individuals who had a history of emotional difficulties which prevented them from maintaining jobs and long-term relationships and/or who were clinically diagnosed as chronically depressed or schizophrenic or possessing various

neuroses, violent reactions or mood disorders were grouped into the Very Low Emotional Stability category (n=77).

Of the 191 subjects who were involved in the Emotional Stability validity study, 100 were males and 91 were females. Ranging in age from 20 to 67, the average age was 45.5 years. Educational level ranged from 8 to 21 years of schooling with an average of 14.5 years. Again, they were an ethnically diverse sample: 103 Caucasian, 40 Black, 21 Hispanic, 7 Asian, and 20 European.

The one-way analysis of variance indicated that these three classifications were significantly different from each other based on scores on the Risk Assessment Emotional Stability scale, $F(2,196) = 252.00$, $p<.0001$. According to their handwriting, those in the Very High Emotional Stability group (M=79.15) were significantly more emotionally stable than were those in the Average group (M=53.12) and those in the Very Low Emotional Stability group (M=22.47). Those in the Average group were significantly more emotionally stable than those in the Very Low group.

All statistical tests supported the predicted relationship between level of emotional stability and classification based on known behaviors. Therefore, this study established initial criterion-related validity of the Emotional Stability scale of the Risk Assessment.

Study Three: Judgment

To investigate the ability of the Judgment scale of the Risk Assessment to discriminate among three groups classified according to their judgment behaviors, an empirical investigation was conducted using 211 participants. Based on the following criterion, individuals were grouped according to their quality of judgment.

Those classified as Very High Judgment demonstrated advanced intellectual development and skill and were recognized either by co-workers or the general public for their superior judgment, sharp mind and decision-making skills. Those categorized as having Average Judgment possessed normal judgment levels and decision-making skills and had neither a serious lack of discretion nor superior abilities in the intellectual domain.

The Very Low Judgment group reflected continual poor discretion and an inability to think clearly or wisely. This included such things as repeated criminal behavior and/or low mental development. Individuals in this category could be described as having not matured intellectually, and as continually making mistakes typically avoided by the general public. Fifty-seven were categorized as Very High Judgment, 79 as Average Judgment, and 75 as Very Low Judgment.

The handwriting of 120 males and 91 females was sampled for this study. Average age was 40 years (ranging from 17 to 69

years) and average educational attainment was 13.5 years (ranging from 7 to 21 years). One hundred thirteen were Caucasian, 39 Black, 30 Hispanic, 13 Asian, and 16 European.

When scores on the Judgment scale of the Risk Assessment were used to test for judgment differences among these three groups, statistical differences were found, $F(2,207) = 229.00$, $p<.0001$. These differences were in the predicted directions with the Very High Judgment group having significantly higher Judgment scores (M=74.07) than those in the Average Judgment group (M=58.98) and those in the Very Low Judgment group (M=26.81). Those in the Average group had significantly higher Judgment scores than did those in the Very Low Judgment group. These findings support the ability of the Judgment scale on the Risk Assessment to discriminate among contrasted groups, and the criterion-related validity of this scale.

Study Four: Substance Abuse Risk

This study was conducted to examine the ability of the Substance Abuse Risk scale of the Risk Assessment to differentiate among individuals classified by their known substance use behaviors. Handwriting samples from 184 persons were used in this study.

These subjects were classified according to three levels of Substance Abuse Risk: Very High Risk, Average Risk, and Very Low

Risk. Descriptors of the 91 classified as Very High include having abused addictive substances such as alcohol, cocaine, crack, speed, marijuana, and other drugs to such a degree that hospitalization was required or repeated job losses occurred. As a result, the subject either was imprisoned or suffered a loss of job, health, or relationships.

An Average Risk classification (n=56) was given to individuals who may have used alcohol or illicit drugs on occasion or to a degree that did not result in loss of job, health, or relationships. Social drinkers were included in this category, if there had been not more than two occurrences of drunkenness and no criminal charges ever filed pertaining to drugs or alcohol. The final category of Substance Abuse Risk was Very Low Risk. People classified as Very Low Risk (n=37) reported having never used alcohol or illicit drugs and were recognized by their co-workers and family for their self-control and discipline.

For the Substance Abuse Risk study, the handwritings of 101 males and 83 females were analyzed. These individuals ranged in age from 17 to 65 years with an average of 39.5 years and in education from 7 to 21 years with an average of 13.5 years of schooling. Various geographic locations in the United States were represented; ethnically, the subjects consisted of 96 Caucasians, 42 Blacks, 31 Hispanics, 4 Asians, and 11 Europeans.

As had been predicted, participants' scores on the Substance Abuse Risk scale of the Risk Assessment were significantly different for the three classifications, $F(2,235) = 290.03$, $p < .0001$. A follow-up test revealed that those classified as Very High Substance Abuse Risk had significantly higher scores ($M = 84.73$) than did those in the other two groups, and average Substance Abuse Risk subjects ($M = 46.18$) scored significantly higher than did those in the Very Low Risk category ($M = 25.80$).

These results support the ability of the Substance Abuse Risk scale of the Risk Assessment to differentiate among individuals who report varying levels of substance use behaviors. Thus, this study helps to establish the criterion-related validity of the Substance Abuse Risk scale

Study Five: Predicting Performance of Telemarketers

A two-phase research study was conducted that resulted in a predictive model being constructed. In the first phase of the study, handwritings from current employees (n=90) were used to construct a predictive model. The subjects were 60 male and 30 female subjects. Ages ranged from 18 to 60 with a mean of 24.5. Ethnic data were not available. In the second phase, the model was used to predict sales productivity of recent hires.

The first phase of the study required the collection of handwritings and productivity figures for current employees. The

12 personality variables evaluated were: Creativity, Self-Discipline, Enthusiasm, Mental Agility, Friendly Disposition, Intense Feelings, Research-Oriented, Concentration, Social Flexibility, Confrontive Behavior, Stability, and Discrimination. Productivity was determined by supervisory ratings based primarily on dollars of sales generated in the last 24 months of employment.

Phase two of the study consisted of using the predictive model to estimate productivity of new hires. Handwritings were collected on incoming applicants (n=100) over a six-month period regardless of their age, race or gender. Hires were made without knowledge of the handwriting analysis reports. After another six-month period (during which the new hires worked as telemarketers), the predicted productivity figures were compared with actual productivity in predicting the performance of the telemarketers.

A multiple regression model was constructed using a backward solution. Results showed a multiple-R of .83 and an R-squared of .87. The superior performers had received consistently higher ratings in the tested traits, and the poorer performers received lower ratings. The research project demonstrated that the CHAPS technique was successful in building a predictive model.

6. HISTORICAL REVIEW OF RESEARCH

The psychological community approves of at least three possible scientific procedures when conducting a research into the study of graphology. These three modes of operation are provided along with comments regarding their strengths and weaknesses, (Williams, 1977).

1. The simplest approach is the "sorting method," which requires a graphologist to examine a group of writing scripts, and then sort them into various bi-polar categories (e.g. male-female or dull-bright). If the sorts are more accurate than chance would predict, then the graphologist's assessments are accepted as a valid assessment measure (Fisch, 1973).
2. The "matching method" is a very similar technique, except that the graphologist must match clinical personality descriptions of individuals with samples of their handwriting (Jansen, 1973).
3. Somewhat more sophisticated is the "ranking method" or "rating method," where the graphologist numerically ranks or rates whole handwriting samples on a set of personality traits; the correlations of these rankings

or ratings with other scaled measures of personality are the validating criteria (Eysenck, 1948b).

These three experimental procedures have, in the main, supported the merits of graphology as a reliable, valid, psychodiagnostic technique (Sandek, 1928; Bobertag, 1929; Castelnuovo-Tedesco, 1948; Eysenck, 1948b). However, these procedures can be criticized on two counts:

1. Since each involves the requirement that the graphologist make judgments on the total script, rather than by specifying a particular feature in the handwriting to a particular trait, this technique provides little insight into the actual clues which graphologists use in the global analysis;
2. Each is weak in satisfying the scientific requirements of objectivity and repeatability of analysis (Birge, 1954).

In countering these criticisms, graphologists have argued that where attempts have been made to specify the signs and traits exhibited in handwriting (such as specific 't' strokes), the important global aspects of the writing are lost (Sonnemann, 1950; Currer-Briggs, 1971). One method, by which both general

aspects and specific details can be studied simultaneously, is factor analysis. Through factor analyses, "clusters" of handwriting shapes can be related to personality traits, which more closely approximates current analyses techniques employed by graphologists. It has been suggested as another possible solution, that a system of analysis be developed whereby the interpretation of handwriting shapes by graphologists be supplemented with a more measurable methodology; that this would further enhance validity findings and bring to the surface what it is exactly that graphologists perceive in making their interpretations.

Reliability of Handwriting Analysis

Are handwriting analysis techniques reliable, and are test results using them replicable? Research to date generally supports the repeatability of test results, interjudge reliability, and overall homogeneity for the handwriting analysis process. In fact, the results of research into handwriting analysis frequently show scores equal or superior to those of most widely used and accepted psychological tests offered today. According to David Lester, Ph.D., "As far as we can tell, handwriting is a very reliable psychological variable. It remains constant from day to day and from year to year, once the style is formed during childhood. Handwriting is probably as

reliable as other psychological variables. Handwriting can also be evaluated by judges quite reliably." (Lester, 1981)

Historical Review: Reliability

Reliability as it pertains to graphology relates to consistency of trait scores obtained by the same test subject when examined with the same writing sample on different occasions, or with different sets of equivalent writing samples, or under other variable examining conditions.

When measuring the strength of handwriting analysis as a reliable tool in personality identification, there are four variables to consider. Provided below is a description of the four types of relevant measures and a review of research for each of the four types. Because of the large number of research studies that have been conducted on graphology, an arbitrary restriction of no more than four researches will be cited for each division of related reliability and validity. The examples selected are to illustrate an array of research origins as well as different time periods of study.

A) Test-Retest. Remeasuring subjects' handwriting after a period of time to determine consistency of results.

1. McNeil, E. and Blum, G. "Handwriting and Psychosexual Dimensions of Personality." Journal of Projective

Techniques. 1952, 16, 476-84. Results: "After a month retest, judge consistency ranged from .63 to .90."

2. Jansen, A. Validation of Graphological Judgments. The Hague: Mouton, 1973. Results: "After a one-year interval, results were .54." (Six months is considered the maximum time limit for retesting as personality variables may change in a year.)

3. Harvey, O. "The Measurement of Handwriting Considered As a Form of Expressive Movement." Character and Personality. 1934, 2, 310-21. Results: "Two-month interval with a correlation of .47 - .85."

B) Test Homogeneity. Consistency of performance on all items that assess a particular quality.

1. Secord, P. "Studies of the Relationship of Handwriting to Personality." Journal of Personality. 1949, 17, 450-98. Results: "Secord had subjects write words and draw lines in patterns that they felt matched a list of words that they were given. Naive judges were able to match the line patterns to the samples of writing at a level of accuracy better than chance, 38% correct versus 25% chance."

2. Lyons, J. "Recognition of Expressive Patterns As a Function of Their Mode of Expression." Journal of

Consulting Psychology, 1964, 28, 85-6. Results: "In this complex study, subjects write with their dominant hand, non-dominant hand, dominant foot, pencil in mouth, pencil fixed with a movable piece of paper, with dominant hand held behind their back, and with dominant hand with eyes closed. Naive judges were able to match at a level of accuracy better than chance the writing with the dominant hand (both with the eyes closed and the eyes open), the non-dominant hand, and the dominant foot. This suggests that a consistency exists in the expressive style of writing."

3. Allport, G. and Vernon, P. Studies in Expressive Movements. New York: MacMillan 1933. Results: "It was successfully determined that people are consistent in their different expressive behaviors; in other words, people have different and individual expressive styles. This permits the theory that handwriting is a form of expressive behavior in the same manner that walking, talking, movements, gestures, etc., reflect idiosyncratic personality inclinations and patterns."
4. Wolff, W. Diagrams of the Unconscious. New York: Game and Stratton, 1948. Results: "It was successfully determined that an individual's emotions and attitudes are expressed in analogous ways in all modes of

expression by any one individual. There are general principles that are common to all people which allow behavioral predictions to be possible."

C) Alternate-Form Testing. A subject tested twice with different forms or versions of the test should score similarly.

1. Woods, W. "Influence of Ink Color on Handwriting of Normal and Psychiatric Groups." Journal of Applied Psychology, 1931, 15, 486-98. Results: "Found the color of ink had no effect on writing size in normal and in psychiatrically disturbed people."
2. Harvey, O. "The Measurement of Handwriting Considered As a Form of Expressive Movement." Character and Personality. 1934, 2, 310-21. Results: "Leisure writings compared to a dictated letter copy two months later. Reliability factor from .47 - .85."
3. Jansen, A. Validation of Graphological Judgments. The Hague: Mouton, 1973. Results: "After a one-year interval, reliability was .54 for judges." This is considered exceptionally high considering a one-year retest period.
4. Kernon, J. and Sonnemann, U. Handwriting Analysis. Personnel. 1962, 39(6), 8-14. Results: This paper

reports high reliability scores obtained by a leading American company which successfully employed a handwriting research consultant.

D) Interrater Reliability. Can different graphologists produce the same profiles?

1. Feldt, L. "The Reliability of Measures of Handwriting Quality." Journal of Educational Psychology, 1962, 53, 88-92. Results: "Found inter-judge reliabilities for ratings of penmanship ranged from .74 to .85."
2. Galbraith, D. and Wilson, W. "Reliability of the Graphoanalytic Approach to Handwriting Analysis." Perceptual and Motor Skills, 1964, 19, 615-8. Results: "Interjudge reliabilities for five handwriting variables were .61 to .87."
3. Zdep, S. and Weaver, H. "The Graphoanalytic Approach to Selecting Life Insurance Salesmen." Journal of Applied Psychology. 1967, 51, 295-99. Results: "Studied thirteen grapho-analytic signs with results being a range from .50 to .85"
4. Birge, W. "An Experimental Inquiry into the Measurable Handwriting Correlates of Five Personality Traits." Journal of Personality. 1954, 23, 214-23. Results:

"Found a correlation of interjudge reliability to be .94 and higher."

Historical Review: Validity

Is handwriting analysis a valid psychological instrument? According to David Lester, Ph.D. (1981), "There are a number of research studies supporting the validity of graphology and the accuracy of graphologists. Furthermore, as long as there is a fair number of studies that demonstrate the success of graphological judgments about people, and there does appear to be a fair number, we must accept that graphological judgments can be valid." (p. 53)

Dr. Lester orchestrated a study whereby a group of traditional psychological tests was compared to the results provided by two handwriting analysts from different cities. His conclusions were as follows, "Contrary to what many psychological testers might expect, the descriptions of personality based upon analyses of handwriting are in good agreement with standard psychological test results. My subjective impression is that the descriptions based on analyses of handwriting are also as accurate as those from standard psychological tests. Psychologists who are interested in personality assessment would do well, then, to give more serious consideration than they

presently do to the use of handwriting as a source of information about people." (p. 161)

A) Predictive validity. Are the results of the instrument used able to predict, accurately, future behavior?

1. Frederick, C. "An Investigation of Handwriting of Suicide Persons through Suicidal Notes." Journal of Abnormal Psychology, 1968, 73, 263-7.
2. Nevo, Baruch. "Yes, Graphology Can Predict Occupational Success: Rejoinder to Ben-Shakhar, et al." Perceptual and Motor Skills, 1988, 66 (1), 92-94.
3. LoMonoco, T., Harrison, R., and Klein, F. "Accuracy of Matching Thematic Apperception Test Scores and Graphological Personality Profiles." Perceptual and Motor Skills, 1973, 36, 703-6.
4. Eysenck, H. "Graphological Analysis and Psychiatry." Journal of British Psychology, 1945, 45, 70-81.

B) Construct Validity. The extent to which the test may be said to measure a theoretical construct or personality trait.

1. Crumbaugh, J. and Stockholm, E. "Validation of Graphoanalysis by 'Global' or 'Holistic' Methods." Perceptual and Motor Skills, 1977, 44, 403-10.

2. Manis, M. and Paskewitz, J.R. "Specificity in Contrast Effects: Judgments of Psychopathology." Journal of Experimental Social Psychology, 1984, 20 (3), 217-230.
3. LoMonoco, T., Harrison, R., and Klein, F. "Accuracy of Matching TAT and Graphological Personality Profiles." Perceptual and Motor Skills, 1973, 36, 703-6.
4. Baram, D.P. "Manifestations of Neuroticism in Handwriting." Voprosy Psikhologii, 1986, 2, 161-163.

C) Concurrent Validity. A different measuring instrument is employed to evaluate accuracy of a test in question.

1. Lester, D., Ph.D. The Psychological Basis of Handwriting. 1981, p. 127-60.
2. Legien, Marek. "The Handwriting Test as Diagnostic Method in Narcotic Addition." Psychiatria Polska. 1984, 18 (3), 233-240.
3. Unknown Author. "Objective Techniques in Personality Testing." Arch. of Neurology. Psychiatry, Chicago. 1939, 42, 514-38.
4. Wellingham-Jones, Patricia. "Evaluation of Adolescents' Self-Esteem Through the Coppersmith Self-Esteem Inventory and Graphometric Analysis of Students' Handwriting." Perceptual and Motor Skills. 1987, 65 (2), 471-480.

Below is a partial list of standardized psychological instruments that have been used in research endeavors to correlate the validity of handwriting analysis, as found in various published journals.

* Eysenck Personality Questionnaire
* Coppersmith Self-Esteem Inventory
* Wellingham-Jones Self-Esteem List
* Wechsler Adult Intelligence
* Kuder Occupational Interest
* Edwards Personal Preference
* House-Tree-Person Test
* Kagan's Impulsivity-Reflectivity
* Thematic Apperception Test
* Vocational Preference Inventory
* Holtzman Inkblot Technique
* Machover's Draw-A-Person Test
* Stanford-Binet Intelligence
* Raven Progressive Matrices
* Science Research Association Primary Mental Abilities
* 16 PF
* Wartegg
* Jackson Personality
* MMPI
* Visual Motor Gestalt
* Self-Esteem Inventory
* FBI
* Luscher Color Test
* Rorschach Inkblot Test
* Human Figure Test
* Pauli-Kraeplin Test
* WISC
* Tennessee Self-Concept
* Eysenck's Extra

7. LEGAL AND ETHICAL ISSUES

In recent years, graphology has increasingly been used by employers in the hiring process (Sonnemann, 1960). A 1985 article in The Wall Street Journal (Risklep, 1985) confirmed that over 80% of France's largest corporations and many corporations in most other European countries employ the services of a graphologist when hiring. In the United States, over 5,000 companies are reported to be using graphology to facilitate hiring decisions as well as for self-improvement, career guidance and team-building (Rader, 1988).

Through a 1987 market-research program conducted with personnel and security risk managers, HRC learned that employers sought reliable and nondiscriminatory methods by which prospective employees and on-staff personnel could be evaluated. Furthermore, they wanted an instrument which would shield their company from possible litigation for any type of unfair hiring practices. In summary, employers sought methods which were non-invasive, yet also satisfied court rulings that the employers were not negligent of a lack of thoroughness in screening out unqualified or dangerous applicants. Faced with impending legal restrictions on use of the polygraph, and the increasing number of lawsuits surrounding the invasive nature of certain

psychological tests, employers were searching for better alternatives.

Equal Employment Opportunity Commission

The Equal Employment Opportunity Commission (EEOC) seeks to promote an ethical, valid and nondiscriminatory employment screening practice among employers. In an effort to achieve that goal, the "Guidelines on Employee Selection Procedures" was established. Those procedures are in the July 21, 1970 revision of Title 29-Labor, Chapter XIV, Part 1607 of the Code of Federal Regulations. Following are passages from that document. They are cited because of their relevancy to the practices of handwriting analysis in hiring.

Section 1607.1 Statement of Purpose.

a) "The guidelines in this part are based on the belief that properly validated and standardized employee selection procedures can significantly contribute to the implementation of nondiscriminatory personnel policies as required by Title VII."

Section 1607.4 Evidence of Validity.

c) "Evidence of a test's validity should consist of empirical data demonstration that the test is

predictive of or significantly correlated with important elements of work behavior..."

Section 1607.5 Minimum Standards of Validity.

a) "For the purpose of satisfying the requirement of this part, empirical evidence in support of a test's validity must be based on studies employing generally accepted procedures for determining criterion-related validity."

Evidence of content or construct validity, as defined in that publication, may also be appropriate where criterion-related validity is not feasible.

1. "Where possible minority samples are taken into account."
2. "Tests must be scored and collected with proper safeguards."
3. "The work behaviors or other criteria of employee adequacy which the test is intended to predict or identify must be fully described."
4. "The general point is that all criteria need to be examined to ensure freedom from factors which would unfairly depress the scores of minority groups."

5. "...in this regard, where a test is valid for two groups, but one group characteristically obtains higher test scores than the other without a corresponding difference in job performance, cutoff scores must be set so as to predict the same probability of job success in both groups."

In assessing the utility of a test:

"The relationship between the test, and at least one relevant criterion must be statistically significant. This ordinarily means that the relationship should be sufficiently high as to have a probability of no more than 1 to 20 to have occurred by chance."

Section 1607.6 Presentation of Validity Evidence.

"Average scores for all tests and criteria must be reported for all relevant subgroups, including minority and non-minority groups where differential validation is required."

Section 1607.7 Use of Other Validity Studies.

"In cases where the validity of a test cannot be determined, (the number of subjects is less than that required for a technically adequate study, or an appropriate criterion measure cannot be developed), evidence from validity studies

conducted in other organizations such as that reported in test manuals and professional literature may be considered acceptable where: a) the studies pertain to jobs which are comparable, and b) there are no major differences in contextual variables."

Section 1607.8 Assumption of Validity.

"Under no circumstances will the general reputation of a test, its author or its publisher, or casual reports of test utility be accepted in lieu of evidence of validity."

Section 1607.9 Continued Use of Tests.

"Under certain conditions, a person may be permitted to continue the required evidence of validity. If, for example, determination of criterion-related validity in a specific setting is practicable and required but not yet obtained, the use of the test may continue: Provided: a) The person can cite substantial evidence of validity as described in 1607.7; and b) he has in progress validation procedures which are designed to produce, within a reasonable time, the additional data required."

Section 1607.11 Disparate Treatment.

"No test or other employee selection standard can be imposed upon a class of individuals protected by Title VII, who but for prior discrimination would have been granted the opportunity to qualify under less stringent selection standards previously in force."

Selection 1607.12 Retesting.

"Employers, unions and employment agencies should provide an opportunity for retesting and reconsideration to earlier "failure" candidates who have availed themselves of more training and experience.

Differential Validity: "Is a test equally predictive for minority as well as nonminority groups?" The EEOC guidelines recognize the possibility that a certain test might not predict equally for minority and nonminority groups.

The guidelines specify that where "technically feasible," tests should be validated separately for each subgroup. A test which is differentially valid may be used in groups for which it is valid but not for those in which it is invalid.

It is noteworthy that the EEOC and OFCCP guidelines define the word "test" in a rather broad manner, when it applies to validation requirements. Besides the commonly used paper-and-

pencil intelligence, aptitude and proficiency tests, their definition includes "all formal, scored, quantified or standardized techniques of assessing job suitability including: Specific qualifying or disqualifying personal history or background requirements, specific educational or work-history requirements, scored interviews, biographical information blanks, interviewers' rating scales, and scored application forms." The question exists, do all such practices need to be validated in order to comply with these guidelines? The answer appears to be "negative." Significant is the fact that only those tests which have an "adverse affect" or "disparate impact" on persons of a particular race, sex, national origin, and so on, required validation. (Bureau of Business Practice, Inc., 1977.)

Does Handwriting Analysis Discriminate Unfairly?

In adulthood, there is no indication that minorities adopt individual writing variations which would require the establishment of special variations for analysis procedure. Therefore, because the handwriting analysis process is unable to differentiate among individuals as to: age, gender, race, religion or physical handicap, it provides greater employee protection. Furthermore, unlike psychological testing which requires the disclosure of the subject's age, gender and sometimes marital status and ethnic background, an analysis of

one's handwriting can be done based solely upon objective data. In other words, a graphologist need not ever meet or see a job applicant or employee, and does not require personal data to prepare a personality profile.

Harry O. Teltscher, Ph.D. states, "Writing impulses emanate from the cortex of the brain, from which they are conveyed into the muscles of the fingers via the nervous system. Actually, the finished product is 'brain' rather than 'hand' writing." This statement, supported by extensive research, substantiates that an analysis of one's handwriting would not be able to discriminate unfairly. This makes sense, when it is taken into consideration that writing behavior is a reflection of thinking patterns, emotions and physiological happenings, and not affected by the writer's appearance, age (once in adulthood), gender, race or religious beliefs. The writing behavior expresses the writer's preferences, inclinations, and both conscious and unconscious thoughts, (Linert and Becker, 1960).

O. L. Harvey demonstrated that exact measurements of handwriting variables, in different specimens from the same writers, were assigned corresponding values, even when these specimens were produced under extremely different sets of circumstances, e.g., leisurely copy vs. forced dictation, (Harvey, 1934). This research revealed that the purpose of one's writing does not disturb significantly the handwriting variables

which affect the final profile produced. Replicable analysis results are insured, regardless of the writing environment.

Other research (Eisenberg, 1938; Castelnuovo-Tedesco, 1946; Lester and McLaughlin, 1976) indicates that it is possible to ascertain one's gender from a handwriting sample above chance, though it did not score at significant levels. However, other research projects were unable to reconstruct such successes, (Kinder, 1926; Goodenough, 1945; and Eisenberg, 1938). It appears that results are inconclusive and unclear, though the predominance of research concludes that discrimination is not possible from an examination of one's writing sample.

Handwriting analysis appears to be a nondiscriminatory technique for the hiring and promotion process because determinations regarding race, gender, age, religion, or other possibly discriminatory items cannot be ascertained from a handwriting sample.

Types of Discrimination

* Gender
* Religion
* Race
* Age
* Sexual preferences
* Physical handicaps

Below, researches are cited which explored various forms of possible discrimination which might be discernible from the use of graphology. Results were consistent in that disparate treatment was not established from an analysis of handwriting.

1. Lester, D., Werling, N., and Heinle, N.H. "Grapho-analytic Differences by Sex and Handedness." Perceptual and Motor Skills. 1982, 55 (3, Pt. 2), 1190.
2. Young, P. "Sex Differences in handwriting." Journal of Applied Psychology, 1931, 15, 486-98.
3. Goodenough, F. "Sex Differences in Judging the Sex of Handwriting." Journal of Social Psychology, 1945, 2, 61-68.
4. Broom, N. Thompson, B., and Bouton, M. "Sex Differences in Handwriting." Journal of Applied Psychology, 1929, 13, 159-66.
5. Castelnuovo-Tedesco, P. "Ratings of Intelligence and Personality from Handwriting." American Psychologist, 1946, 1, 455.
6. Eisenberg, P. "Judging Expressive Movements." Journal of Applied Psychology, 1938, 22, 48-6.

7. Lester, D., Dunn, S., and McLaughlin, S. "Sex Deviant Handwriting and Homosexuality. Unpublished, 1977.

8. Lenke, E. and Kirchner, J. "A Multivariated Study of Handwriting, Intelligence and Personality Correlates." Journal of Personality Assessment, 1971, 35, 583-92.

9. "The Handwriting of Indians." Journal of Educational Psychology, 1939, 30, 69-73.

10. Lester, D. and McLaughlin, S. "Sex-deviant Handwriting and Neuroticism." Perceptual and Motor Skills, 1976, 43, 770.

11. Garth, T., Mitchell, M. and Anthony, C. "The Handwriting of Negroes." Journal of Educational Psychology, 1939, 30, 69-73.

12. "A Diagnostic Study of Indians' Handwriting." Journal of Educational Psychology, 1932, 23, 703-7.

13. Middleton, W. "The Ability of Untrained Subjects to Judge Age and Intelligence from Handwriting Samples." Journal of Applied Psychology. 1941, 5, 331-40 (9).

14. Anderson, Timothy. "Psychosexual Symbolism in the Handwriting of Male Homosexuals." Psychological Reports. 1986, 58 (1), 75-81.

Legal Issues

Handwriting, as viewed by the Federal Courts, is considered public domain; there is no civil law precluding the use of handwriting. The following are Supreme Court decisions which directly or indirectly involve the use of one's handwriting:

In United States v. Mara, 410 U.S. 19, 41 LW 4185 (1973), the Supreme Court held that the Fourth Amendment is not violated by a compelled production of "physical characteristics" that are constantly exposed to the public. The court stated: "Handwriting, like speech, is repeatedly shown to the public and there is no more expectation of privacy in the physical characteristics of a person's script than there is in the tone of his voice."

In United States v. Dionisio, 410 U.S. 1, 41 LW 4180 (1973), the Supreme Court held that the physical characteristics of a person's voice or handwriting, or facial characteristics, being constantly exposed to the public view, are not within the protection of the Fourth Amendment.

In Gilbert v. California, 388 U.S. 263 (1967), the Supreme Court held that the compelled production of handwriting exemplars does not violate the Fifth Amendment privilege against self-incrimination. Moreover, the court stated: "A mere handwriting exemplar, in contrast to the content of what is written, like the

words or body itself, is an identifying characteristic outside (Fifth Amendment) protection."

In United States v. Sydney W. Rosinsky, FR. P249, F2d No. 2, March 7, 1977, the court held that handwriting is behavior in public--no intrusion into privacy.

In summary, research supports handwriting analysis as a legal, ethical, and nondiscriminatory method of assessing personality, as it does not ask invasive questions or obtain unrelated-to-job knowledge about the test subject. In addition, when properly conducted it does not violate any of the EEOC standards and regulations.

8. REFERENCES

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APPENDIX

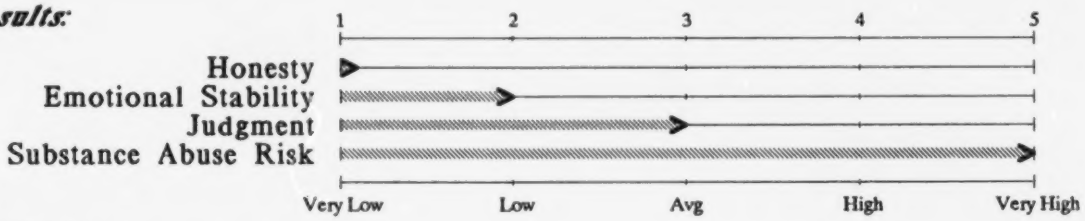
SAMPLE

Risk Assessment

Client Code: 9326-259-6615
Date: 09/18/89
Purpose: Mechanic/Driver

The opinions contained herein are based upon a personality assessment derived from a handwriting sample. Like other personality instruments, these results should be used in conjunction with other sources of information. This person's scores match those who possess the below attributes to the degree described. This Assessment is intended for the sole and confidential use of the client.

Results:



Analysis:

Honesty:	(Very Low)	This individual's scores match those who are extremely deceitful; those who distort and falsify the truth when advantageous.
Emotional Stability:	(Low)	Moody, sometimes unpredictable behavior. Emotionally inconsistent. Does not always handle pressure well.
Judgment:	(Avg)	Decision-making abilities fall within the mainstream of the general population. Relies upon conventional reasoning. Exhibits normal discretion.
Substance Abuse Risk:	(Very High)	The data suggests this individual has the personality type which matches those who are dangerously vulnerable to addiction; may become dependent upon drugs or alcohol when exposed.

Summary:

This individual rated poorly in three of the four areas. Two scores in particular are most salient--the very low rating in honesty and the extremely high risk of substance abuse. Mentally, the writer falls within the average range, but better performance could be expected if these potential problem areas were corrected. The data suggests that these areas should be explored carefully before a decision is made.

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SAMPLE

Basic Screening Profile

The purpose of this report is to provide employers with an initial screening of job applicants, through handwriting analysis. Prior to finalizing your selection, you may want to upgrade to our Comprehensive Profile which gives more in-depth information. The Basic Screening Profile should be used in conjunction with other job related criteria in making employment decisions. This assessment is based upon an analysis of the handwriting sample attached and is intended for the sole and confidential use of the client.

The ***Basic Screening Profile*** includes:

PART 1. *The Bar Chart*
This chart graphically displays 16 personality traits on vertical bars ranging from 0-10. Trait strength is indicated by the height of the bar. The traits have been selected in response to employer interest and are applicable to most job positions. Remember that some traits may be more important than others, depending upon the job requirements.

PART 2. *Definitions*
This section is a two-page review of the Bar Chart which includes definitions of the traits, and arrows recapping the Bar Chart scores.

NOTE: It is essential that, if you have not already done so, you discuss this profile with an HRC Client Service Representative in order to properly understand and effectively use this profile. Fifteen minutes of consultation is provided at no additional cost.

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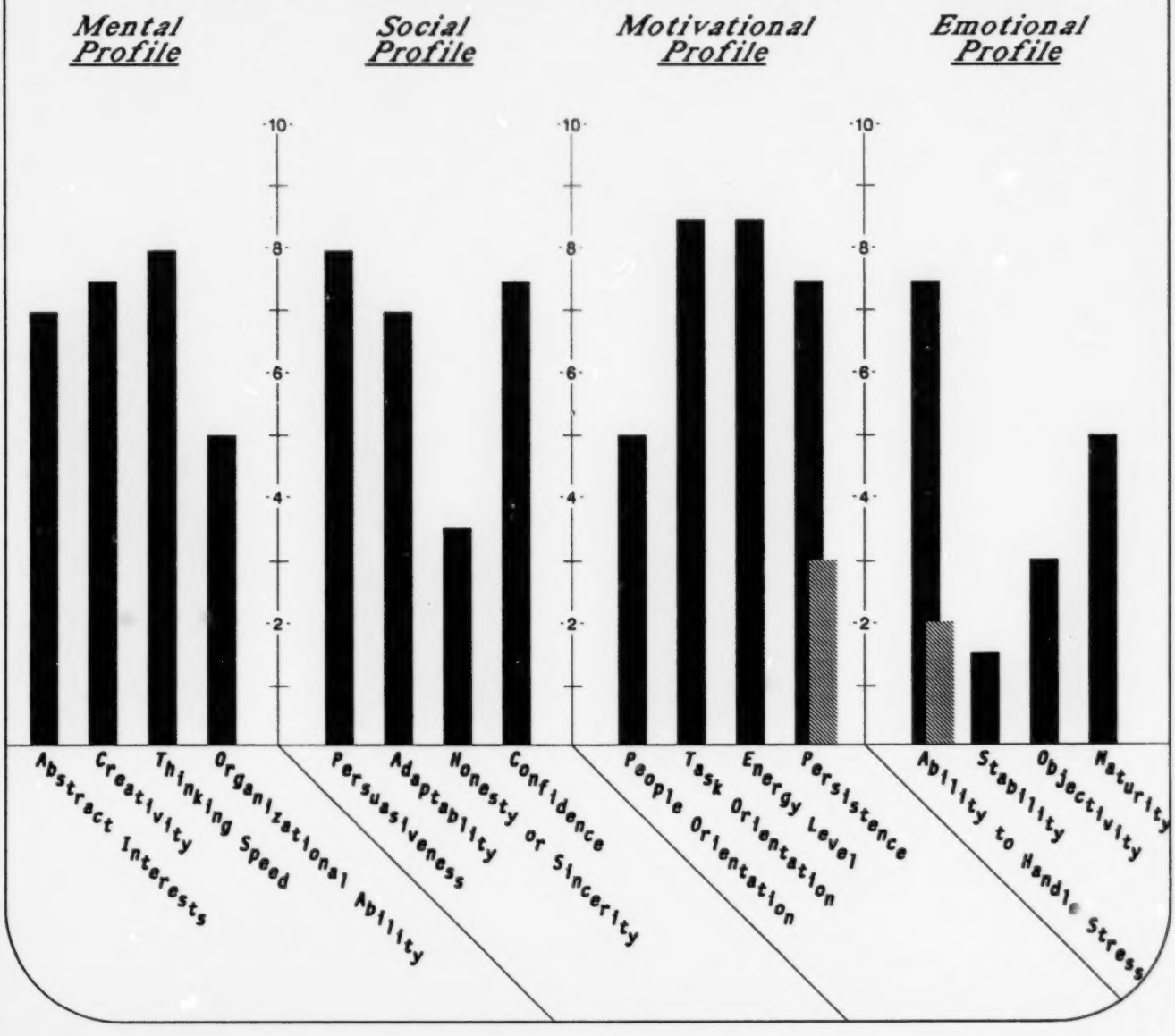
SAMPLE

Bar Chart

Client Code: 9326-258-13260
Date: 09/18/89
Purpose: Sales Manager

Trait Strength
0 5 10
Very Low Avg Very High

Note: Gray bar indicates inconsistent behavior; trait fluctuates from one level of intensity to another.



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SAMPLE

Trait Definitions

Client Code: 9326-258-13260
Date: 09/18/89
Purpose: Sales Manager

Trait Strength
0 5 10
Very Low Avg Very High

Mental Profile

- *Abstract Interests* -- degree to which one is focused on ideas, theories and abstract issues. 7
- *Creativity* -- ability to generate innovative, original ideas and solutions; displays ingenuity. 7.5
- *Thinking Speed* -- rate at which new information is comprehended. 8
- *Organizational Ability* -- ability to systematize and structure thoughts and / or activities. 5

Social Profile

- *Persuasiveness* -- ability to convince and influence others to think or act differently. 8
- *Adaptablity* -- ability to work with different types of people; social flexibility. 7
- *Honesty or Sincerity* -- degree to which one adheres to truthfulness; genuine and non-misleading. 3.5
- *Confidence* -- degree of self-assurance in social and public settings. 7.5

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SAMPLE

Trait Definitions

Client Code: 9326-258-13260
Date: 09/18/89
Purpose: Sales Manager

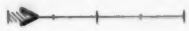
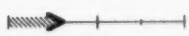
Trait Strength
0 5 10
Very Low Avg Very High

*Note: Double arrows indicate inconsistent behavior; trait fluctuates from one level of intensity to another.

Motivational Profile

- *People Orientation* -- degree to which social interaction acts as a motivator. 5
- *Task Orientation* -- degree to which projects and work assignments act as a motivator. 8.5
- *Energy Level* -- degree of stamina, vitality and enthusiasm that is exhibited. 8.5
- *Persistence* -- degree of tenacity, endurance and perseverance. *

Emotional Profile

- *Ability to Handle Stress* -- ability to work in high-pressure, tense and demanding conditions. *
- *Stability* -- degree of emotional balance and consistency; reliable and predictable attitudes.  1.5
- *Objectivity* -- ability to keep emotional reactions from interfering with judgment; fair and impartial.  3
- *Maturity* -- degree of personal development and refinement. 5

SAMPLE

Comprehensive Profile

The purpose of this report is to provide insight into the personality and behavior of the individual being evaluated. This is not a pass or fail test, but a personality profile of a unique individual. This assessment is based upon an analysis of the client-provided handwriting sample attached and is intended for the sole and confidential use of the client.

The ***Comprehensive Profile*** is divided into three parts:

PART 1. *Summary*
This one page Summary chart provides a concise and easy to understand overview of the writer's personality by clearly categorizing the writer's abilities and limitations. By examining the number as well as the intensity of traits in each category, a quick assessment can be made as to where the writer excels and where potential problems exist. This assessment is enhanced and specifically adapted to client needs through a consultation with an HRC Client Service Representative.

PART 2. *Strengths and Weaknesses*
This two to four page portion of the personality profile describes each Strength and Weakness in detail and prioritizes them in order of intensity. Realize that not all Strengths are beneficial to every situation and not all Weaknesses are detrimental. For example, a high score in 'Secretive' enables a person to maintain confidentiality, but may become a problem in close relationships.

PART 3. *Trait Analysis Graph*
The graph appears on four separate pages – mental, social, motivational and emotional. This comprehensive, four-page graph is computer-generated and measures more than 125 traits derived from an analysis of the handwriting sample. When interpreting the graph, realize that there is no "good" or "bad" side and that the traits relate exclusively to the heading under which they appear. For example, under the heading "Thinking Style" on the Mental Profile, we measure "Flexible." This relates specifically to "Thinking Style" and does not indicate that the writer is necessarily socially "Flexible."

NOTE: It is essential that, if you have not already done so, you discuss this analysis with an HRC Client Service Representative in order to properly understand and effectively use this profile. Fifteen minutes of consultation is provided at no additional cost.

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Summary

Client Code: 9326-257-13177
Date: 09/18/89
Purpose: Sales

● Very High : 90-100
◘ High : 80-90
○ Above Average : 65-80
• Opposite trait also present

Mental

Strengths	Weaknesses
◘ Persistence	● Inattentive-to-Details
○ Rapid Comprehension	◘ Indecisive
○ Creative Thinking	○ Inefficient
○ Objective•	○ Impatient
○ Flexible	○ Undisciplined
○ Intuitive	○ Unconcerned with Present
○ Organized	○ Subjective•
○ Shrewd	

Social

Strengths	Weaknesses
◘ Confident	○ Sensitive-to-Criticism
○ Independent•	○ Suspicious
○ Persuasive	○ Dependent•
○ Articulate	
○ Adaptable	
○ Modest	
○ Diplomatic	

Motivational

Strengths	Weaknesses
● Self-Motivated	○ Non-Materialistic
● Energetic	
○ Handles Pressure Well	
○ Task-Oriented	

Emotional

Strengths	Weaknesses
○ Mature	○ Anxious
	○ Lacks Control

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Strengths and Weaknesses

Client Code: 9326-257-13177
Date: 09/18/89
Purpose: Sales

Consider carefully which personality strengths are relevant to job performance.

Strengths

To a Very High Degree (Intensity 90-100):

- enthusiastic and energetic; action-oriented

To a High Degree (Intensity 80-90):

- not easily discouraged; persistent
- has faith in one's abilities; confident

To an Above Average Degree (Intensity 65-80):

- at times, independent; capable of working alone
- at times, unbiased and objective judgment
- original, innovative ideas; creative
- can persuade and influence others
- performs well in stressful conditions
- speaks and communicates clearly; articulate
- mentally flexible and open
- adaptable to different social conditions
- displays tact in interpersonal involvements; diplomatic
- humble and modest
- utilizes intuition and insight
- astutely aware of surrounding events; shrewd
- task-oriented; motivated by projects
- thinking is organized; systematically thinks things through

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Strengths and Weaknesses

Client Code: 9326-257-13177
Date: 09/18/89
Purpose: Sales

Consider carefully which of the personality weaknesses might interfere with job performance. See also cover page explanation.

Weaknesses

To a Very High Degree *(Intensity 90-100):*

- overlooks or ignores details

To a High Degree *(Intensity 80-90):*

- indecisive; lacks confidence in decision-making

To an Above Average Degree *(Intensity 65-80):*

- feels uneasy and anxious
- impatient and restless
- impulsive; acts on emotion with little thought
- touchy; sensitive to criticism
- shows little self-control or discipline
- suspicious; believes the intentions of others to be dishonorable
- responds little to contemporary issues and needs; not practical
- at times, lacks self-sufficiency; dependent
- at times, subjective and emotional reactions; judgment lacks objectivity

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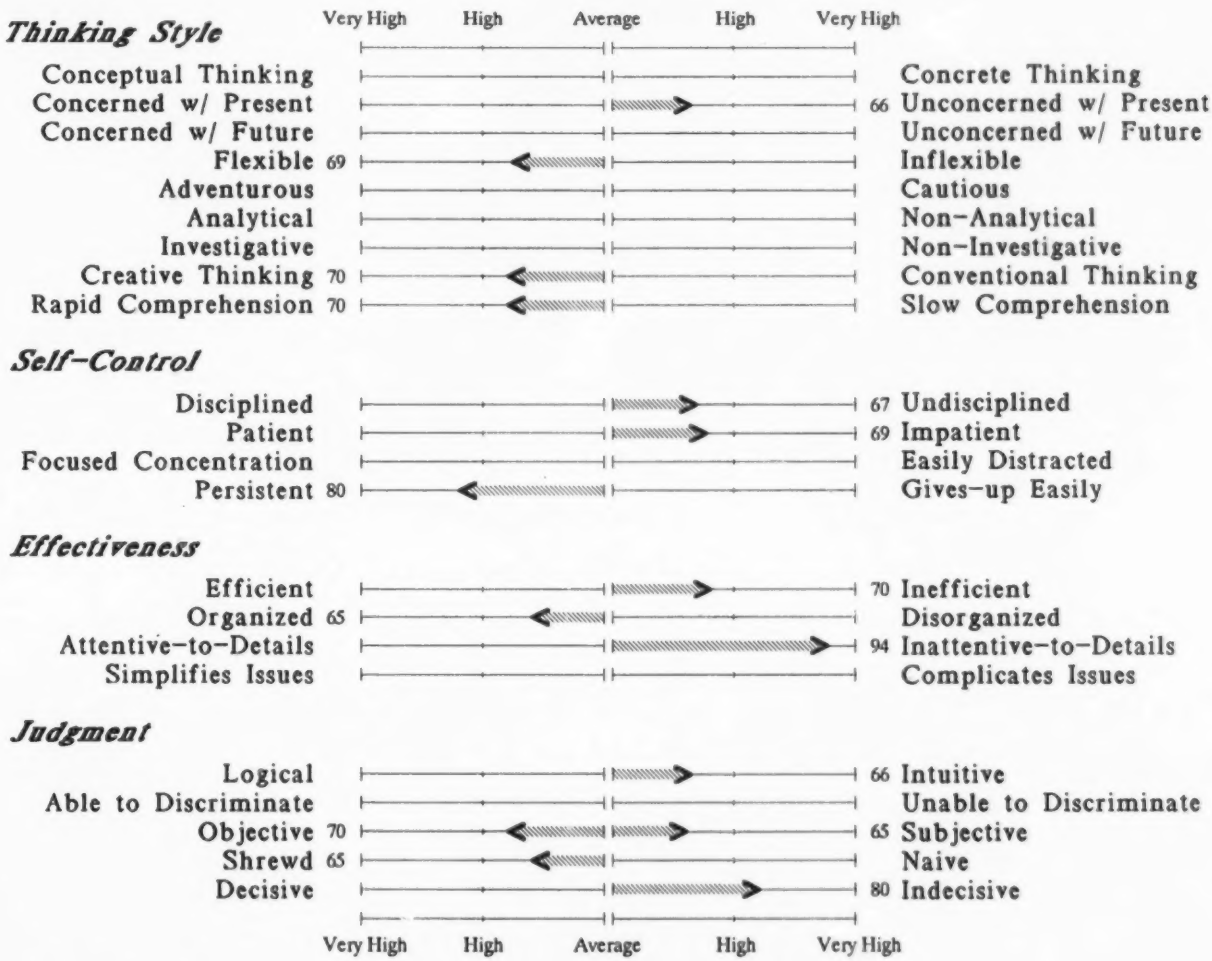
Trait Analysis Graph

Client Code: 9326-257-13177
Date: 09/18/89
Purpose: Sales

A single arrow reflects the extent and intensity of that trait.
Double arrows indicate both traits are significant. Sometimes the writer displays one trait; at other times, the opposite trait.
This appears when both traits are average in strength.

Mental Profile



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Trait Analysis Graph

Client Code: 9326-257-13177
Date: 09/18/89
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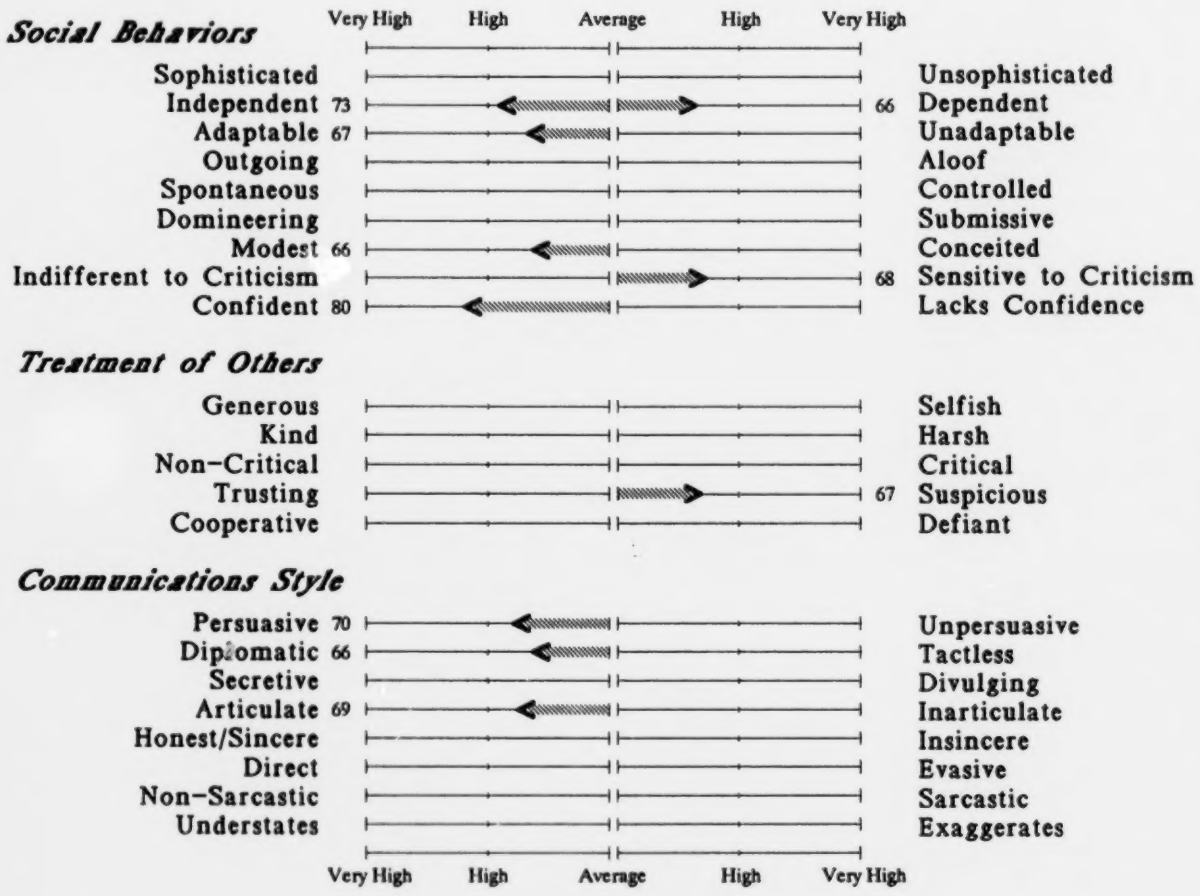
A single arrow reflects the extent and intensity of that trait.
Double arrows indicate both traits are significant. Sometimes the writer displays one trait; at other times, the opposite trait.
This appears when both traits are average in strength.

Social Profile



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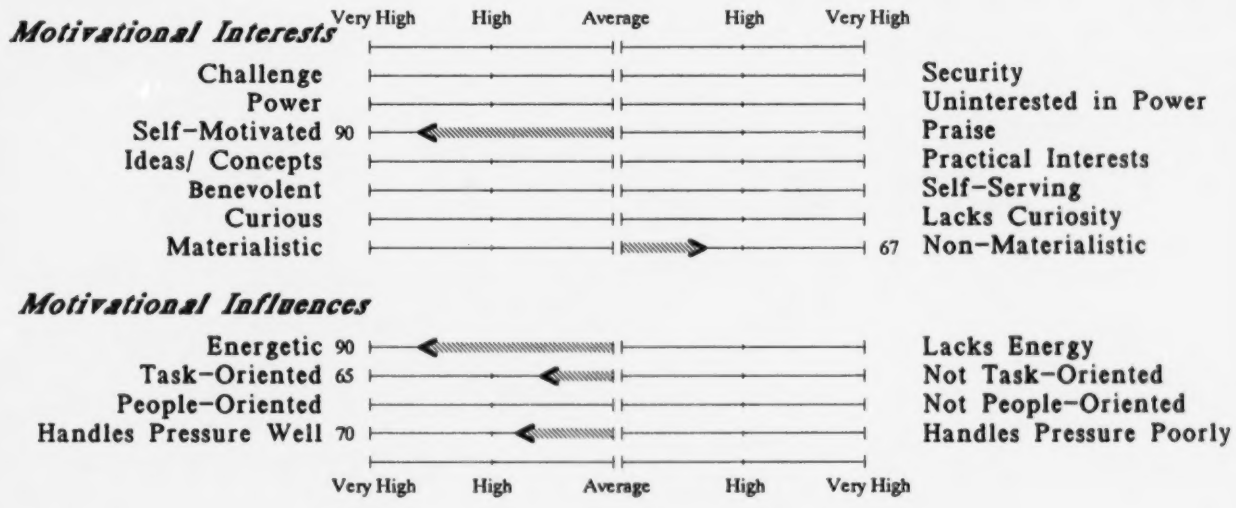
SAMPLE

Trait Analysis Graph

Client Code: 9326-257-13177
Date: 09/18/89
Purpose: Sales

A single arrow reflects the extent and intensity of that trait.
Double arrows indicate both traits are significant. Sometimes the writer displays one trait; at other times, the opposite trait.
This appears when both traits are average in strength.

Motivational Profile



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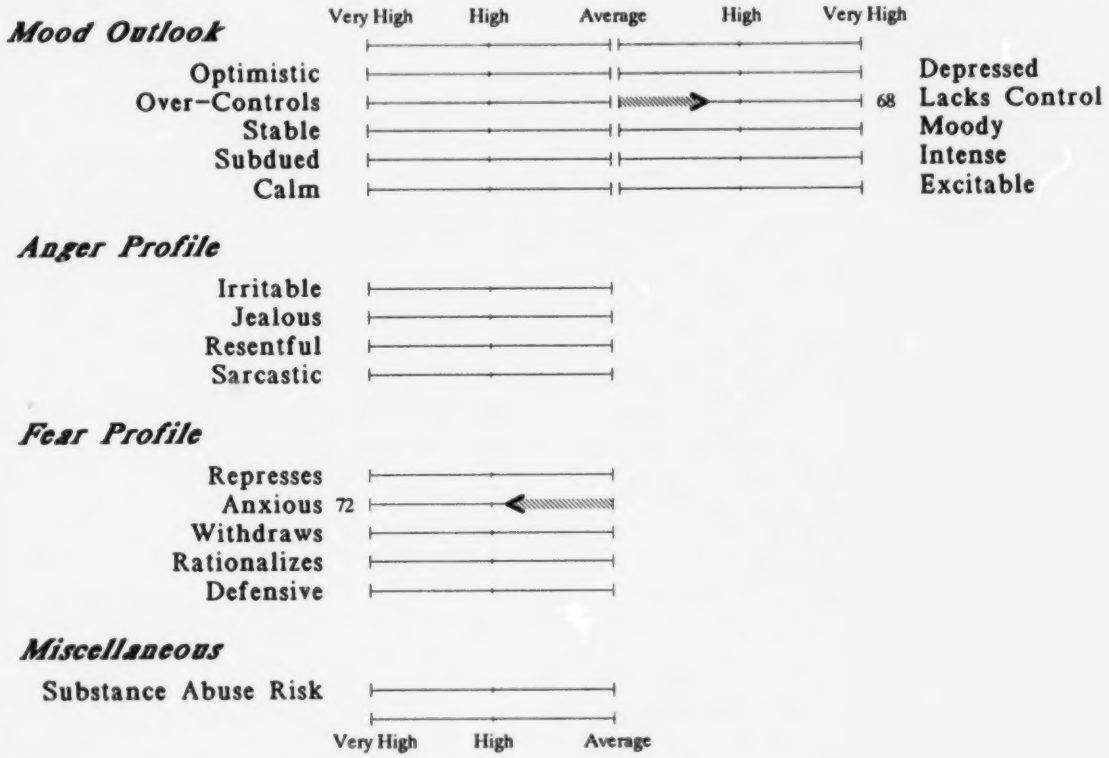
SAMPLE

Trait Analysis Graph

Client Code: 9326-257-13177
Date: 09/18/89
Purpose: Sales

A single arrow reflects the extent and intensity of that trait.
Double arrows indicate both traits are significant. Sometimes the writer displays one trait; at other times, the opposite trait.
No arrow appears when the trait is average or below in strength.

Emotional Profile



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GLOSSARY OF TRAITS

Mental Profile

Thinking Style

Conceptual Thinking:	Attracted to complex ideas, concepts and theories.
Concrete Thinking:	Uninterested in ideas, concepts and theories; thinking focused on concrete issues.
Concerned w/Present:	Directs attention to immediate, day-to-day events and activities.
Unconcerned w/Present:	Unconcerned with immediate needs and day-to-day activities.
Concerned w/Future:	Interested in long-range planning; goal oriented.
Unconcerned w/Future:	Has little interest in long-range planning.
Flexible:	Can change and adapt thinking to the situation; mentally versatile.
Inflexible:	Unwilling to adapt or change viewpoints; rigid, stubborn thinking.
Adventurous:	Willing to explore experimental and daring ideas and opportunities.
Cautious:	Carefully evaluates matters before proceeding.
Analytical:	Has ability to dissect, scrutinize and critique information and situations.
Non-Analytical:	Does not analyze or scrutinize information; accepting of facts without evaluation.
Investigative:	Searches, probes and explores issues; a questioning, inquiring mind.
Non-Investigative:	Not interested in probing, exploring or questioning events or information; has little curiosity.
Creative Thinking:	Has original and innovative ideas and solutions.
Conventional Thinking:	Follows traditional methods and procedures; not innovative or creative.
Rapid Comprehension:	Learns new information quickly.
Slow Comprehension:	Learns and assimilates new information slowly.

Self-Control

Disciplined:	Practices self-control; good self-command.
Undisciplined:	Exhibits little self-control or restraint.
Patient:	Has ability to wait calmly; tolerant of slow processes and delays.
Impatient:	Has difficulty tolerating slow processes; becomes hasty and upset when delayed.
Focused Concentration:	Sustains focus of attention despite distractions.
Easily Distracted:	Has trouble focusing thoughts; lacks concentration.
Persistent:	Endures until goals are reached; not easily sidetracked or discouraged.
Gives-up Easily:	Lacks persistence and tenacity; quits when difficulties arise.

Effectiveness

Efficient:	Thinking is relevant, clear and productive.
Inefficient:	Thinking is unclear, irrelevant and unproductive.
Organized:	Orderly, well-structured, systematic thinking.
Disorganized:	Poorly structured, disorderly thinking.
Attentive-to-Details:	Thorough; attends to the small aspects of a task.
Inattentive-to-Details:	Not thorough; does not attend to the small aspects of a task.
Simplifies Issues:	Skilled at simplifying difficult and complex problems and issues.
Complicates Issues:	Elaborates unnecessarily; considers too many variables.

Judgment

Logical:	Reasonable, rational thinking; decisions are based upon facts.
Intuitive:	Insightful and sensitive perceptions; instinctive understanding.
Able to Discriminate:	Able to distinguish subtle differences.
Unable to Discriminate:	Has trouble distinguishing subtle differences.
Objective:	Fair, impartial judgment; ability to put personal opinions and feelings aside.
Subjective:	Judgment is influenced by personal opinions and feelings; emotional reactions.
Shrewd:	Cunning, clever and resourceful in business and practical affairs.
Naive:	Unsuspecting and immature perceptions; gullible.
Decisive:	Skilled in decision-making; makes decisions easily.
Indecisive:	Hesitant and unsure when making decisions.

Social Profile

Social Behaviors

Sophisticated:	Displays social grace and skill; appropriate social behavior.
Unsophisticated:	Lacks social grace and skill; inappropriate social behavior.
Independent:	Self-directed and self-reliant; works well alone.
Dependent:	Relies upon others for direction and instruction.
Adaptable:	Adjusts easily to different types of people and situations.
Unadaptable:	Has difficulty adjusting to unfamiliar social situations.
Outgoing:	Extroverted, friendly and sociable.
Aloof:	Detached, reserved, and distant in social situations.
Spontaneous:	Prompt, unplanned, natural reactions in social settings.
Controlled:	Preplanned and careful social behavior; not impulsive.
Domineering:	Over-bearing, oppressive and controlling of others.
Submissive:	Excessively yielding and subservient.
Modest:	Humble and unassuming, does not seek attention.
Conceited:	Attitude of superiority; vain and arrogant.
Indifferent-to-Criticism:	Unaffected by the negative attitudes or criticisms of others.
Sensitive-to-Criticism:	Becomes touchy and upset when critiqued or analyzed.
Confident:	Has faith in personal abilities; self-assured.
Lacks Confidence:	Unsure of oneself in the presence of others.

Treatment of Others

Generous:	Giving and unselfish; bighearted.
Selfish:	Self-serving; uninterested in the welfare of others.
Kind:	Gentle and considerate of others.
Harsh:	Hard and inconsiderate; shows little kindness to others.
Non-Critical:	Does not attack and judge others; accepting.
Critical:	Too quick to attack and judge others; fault-finding.
Trusting:	Readily accepts people without question; has faith in others.
Suspicious:	Questions the intentions of others; distrustful of people's motives.
Cooperative:	Helpful and agreeable attitude.
Defiant:	Resists authority; challenging and uncooperative.

Communications Style

Persuasive:	Able to convince and influence the minds and actions of others.
Unpersuasive:	Unable to sway or influence people.
Diplomatic:	Handles interpersonal politics tactfully.
Tactless:	Lacks diplomacy in interpersonal relations; socially rude and insensitive.
Secretive:	Discreet in handling private information; able to keep secrets.
Divulging:	Discloses information freely; has difficulty keeping secrets.
Articulate:	Skilled communicator; expresses thoughts clearly and fluently.
Inarticulate:	Has difficulty expressing thoughts clearly; speech lacks fluency.
Honest/Sincere:	Genuine and truthful; will not mislead others.
Insincere:	Relates in a pretentious and dishonest manner; can mislead others.
Direct:	Communicates openly; discusses issues head-on.
Evasive:	Avoids disclosing information when advantageous; purposefully vague and ambiguous.
Non-Sarcastic:	Will not make caustic comments or remarks.
Sarcastic:	Uses cutting, hostile humor to hurt others.
Understates:	Understates and undercalculates issues.
Exaggerates:	Blows reality out of proportion; embellishes and overstates descriptions.

Motivational Profile

Motivational Interests

Challenge:	Enjoys overcoming obstacles and difficulties.
Security:	Motivated by job and family security.
Power:	Seeks opportunities for leadership and control.
Uninterested in Power:	Not interested in controlling or directing others.
Self-Motivated:	Has inner drive to achieve; does not require encouragement from others.
Praise:	Motivated and inspired by encouragement and peer support.
Ideas/Concepts:	Interested in ideas, concepts and theories.
Practical Interests:	Interested in short-term goals and present circumstances.
Benevolence:	Seeks opportunities to do good to others even at personal expense.
Self-Serving:	Interested in opportunities to enhance self at the expense of others.
Curious:	Investigative and inquisitive mind.
Lacks Curiosity:	Accepts things without question.
Materialistic:	Motivated by tangible reward or compensation for work performed.
Non-Materialistic:	Not motivated by material reward and compensation.

Motivational Influences

Energetic:	Has stamina, vitality and enthusiasm.
Lacks Energy:	Lacks stamina, vitality and enthusiasm.
Task-Oriented:	Motivated by tasks and projects; enjoys work assignments.
Not Task-Oriented:	Not interested in or motivated by tasks or projects.
People-Oriented:	Motivated by social involvement; enjoys people interaction.
Not People-Oriented:	Not interested in or motivated by social interaction.
Handles Pressure Well:	Copes well under stressful and demanding conditions.
Handles Pressure Poorly:	Has difficulty handling stressful and demanding conditions.

Emotional Profile

Mood Outlook

Optimistic:	Maintains a hopeful and positive outlook.
Depressed:	Discouraged; feels helpless and down.
Over-Controls:	Feelings held back; restrains and suppresses emotions.
Lacks Control:	Uncontrolled emotional reactions; impulsive expression of feelings.
Stable:	Consistent moods and behavior; emotionally stable.
Moody:	Inconsistent moods; emotions change easily.
Subdued:	Emotions are only lightly experienced; lack of emotional intensity.
Intense:	Strong and deeply felt emotions.
Calm:	Mild and serene; not easily excited.
Excitable:	Becomes emotional easily; feelings surface quickly.
Mature:	The degree of mental, social and emotional development and refinement achieved.
Immature:	Inadequate development of personality in mental, social and/or emotional areas.

Anger Profile

Irritable:	Aggravated, annoyed and touchy.
Jealous:	Demands exclusive devotion; distrustfully watchful and possessive.
Resentful:	Not inclined to forgive insults or mistreatment; holds grudges.
Sarcastic:	Attacks others through bitter, cutting humor.

Fear Profile

Represses:	Does not acknowledge one's feelings; ignores unpleasant experiences.
Anxious:	Apprehensive, worried and tense.
Withdraws:	Retreats emotionally from conflict or confrontation.
Rationalizes:	Devises excuses to explain inappropriate behavior.
Defensive:	Unwarranted anticipation of attack; overly self-protective.

Miscellaneous

Substance Abuse Risk:	The degree to which one is prone to addictive substances and behavior.

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